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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 1
JANUARY 1, 1974

W74-00001 – W74-00550

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 1
JANUARY 1, 1974

W74-00001 -- W74-00550

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

SIGMA-INDUCTIVE MODEL VS. FIELD MODEL. OBSERVATION OF A REVERSED ATTENUATION EFFECT,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00323

MECHANISM OF TRANSMISSION OF NONCONJUGATIVE SUBSTITUENT EFFECTS. IV. ANALYSIS OF THE DISSOCIATION CONSTANTS OF 6-SUBSTITUTED SPIRO (3.3) HEPTANE-2-CARBOXYLIC ACIDS,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00324

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2A. General

METHODOLOGY FOR ASSESSING THE POTENTIAL IMPACT OF URBAN DEVELOPMENT ON URBAN RUNOFF AND THE RELATIVE EFFICIENCY OF RUNOFF CONTROL ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
G. Leclerc, and J. C. Schaake.
Available from the National Technical Information Service as PB-224 477, $6.25 in paper copy, $1.45 in microfiche. Report 167, 1973. 257 p, 66 fig, 28 tab, 40 ref, 4 append. OWRR C-2137 (No 3403) (5). 14-31-0001-3403.

Descriptors: *Urban runoff, *Storm runoff, *Rainfall-runoff relationships, *Urbanization, *Detention reservoirs, *Mathematical models, *Statistical models, Urban hydrology, Surface runoff, Precipitation, Storm drains, Urban drainage, Model studies.

A methodology was developed to assess the potential impact of urban development on urban runoff and to measure the relative efficiency of runoff control alternatives. The methodology utilizes runoff frequency curves, derived at different stages of development of the urban catchment. Comparisons of these curves completely quantify the impact of urban development and/or the efficiency of a control structure. Runoff frequency curves are derived directly from the rainfall process. The method of solution utilizes a stochastic model of the rainfall process and a deterministic model of the catchment. The rainfall model describes the rainfall exterior and the rainfall interior and preserves the Intensity-Duration-Frequency curves of the historical rainfall sample. The catchment model developed with the kinematic wave equations is a modular model; detailed and simplified configurations of the prototype catchment have been successfully developed. Filter theory is used to estimate the parameters of the infiltration model from observations of the rainfall and of the runoff. The method of solution, referred to as stochastic/deterministic simulation, incorporates the stochastic rainfall model, the deterministic catchment model, and the results of the infiltration estimator. Results show that the solution procedure and the methodology developed are recommended for urban drainage analysis.
W74-00001

INTERACTION OF BULK PRECIPITATION, STREAM WATER, AND SEWAGE IN A SMALL WATERSHED NEAR OXFORD, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
K. J. Banaszak, C. B. Whitten, and D. A. Thompson.
Available from the National Technical Information Service as PB-224 434, $3.75 in paper copy, $1.45 in microfiche. Mississippi State University, Mississippi. State Water Resources Research Institute Report, August 1973. 70 p, 21 fig, 11 tab, 155 ref. OWRR A-063-MISS (1).

Descriptors: Weathering, Chemical reactions, Heavy metals, Soils, *Mississippi, *Small watersheds, *Precipitation (Atmospheric), *Sewage, *Streamflow, Discharge (Water), Storm runoff, Chemical analysis.
Identifiers: *Oxford (Miss), *Urban watersheds.

A 500 hectare (54% forest, 26% pasture and fallow field, and 20% rural urban) rainfed watershed near Oxford, Mississippi was studied from July 1, 1972 to June 30, 1973. During this period, 200 centimeters (132 cm are 'normal') of precipitation with an average pH of 4.6 and an average composition in parts per million of 0.66 calcium, 0.04 magnesium, 0.54 sodium, and 0.23 potassium fell. The stream discharge of 80 centimeters had a neutral pH and an average composition in parts per million of 6.4 calcium, 1.5 magnesium, 6.4 sodium, 2.2 potassium, 13 bicarbonate, 12 sulfate, and 5.5 chloride. A sewage influx of 50 liters per second had little noticeable effect on the composition of storm runoff. The reasons for the change from bulk precipitation to stream water are not clear but must involve biologic, aerosol, and anthropogenic material. The change is compatible with a change from a water in equilibrium with gibbsite to a water in equilibrium with gibbsite and kaolinite. The net output for the study year from the watershed in kilograms per hectare-year was 43 for calcium, 12 for magnesium, 44 for sodium, 14 for potassium, and 36 for silica. These outputs are not compatible with earlier studies but are compatible with gross chemical erosion rates. Data for cadmium and zinc were inconclusive.
W74-00005

DEVELOPING A COOPERATIVE RESEARCH PROGRAM FOR FLOOD CONTROL IN BRAHMAPUTRA VALLEY,
Brahmaputra Flood Control Commission (India).
For primary bibliographic entry see Field 10A.
W74-00195

DIGITAL MODEL OF THE HYDROLOGIC SYSTEM, NORTHERN HIGH PLAINS OF COLORADO--A PRELIMINARY REPORT,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02F.
W74-00330

WATER IN THE SAN LUIS VALLEY, SOUTH-CENTRAL COLORADO,
Geological Survey, Denver, Colo.
P. A. Emery, R. J. Snipes, J. M. Dumeyer, and J. M. Klein.
Colorado Water Resources Circular No 18, 1973. 26 p, 7 fig, 10 plate, 2 tab, 14 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Hydrologic data, *Colorado, Water quality, Mountains, Snowmelt, Streams, Aquifer characteristics, Hydrogeology, Valleys, Water wells, Water utilization, Irrigation, Domestic water, Livestock, Confined water, Water yield, Groundwater recharge, Chemical analysis, Hydrologic budget, Deserts.
Identifiers: *San Luis Valley (Colo).

The San Luis Valley of south-central Colorado is a high mountain desert with an area of approximately 3,200 square miles. It has an average altitude of about 7,700 feet, and the annual precipitation averages about 7.5 inches. The primary source of water to the valley is surface-water inflow derived chiefly from snowmelt. About 86% of the water supplied to the valley by surface-water inflow and precipitation is consumed by evapotranspiration. Irrigation has increased during the last two decades, mainly due to substantially increased withdrawal of groundwater. More than 1,800 large-capacity irrigation wells withdraw water from the unconfined aquifer. Water is withdrawn from the confined aquifer by more than 650 large-capacity irrigation wells and about 7,000 small-capacity domestic, stock, and pasture-irrigation wells. The chemical quality of water in the unconfined aquifer is excellent around the rim of the valley. In the central part of the valley water in the confined aquifer has a brownish color and contains gas. This colored water is commonly associated with high fluoride concentration and high salinity and alkali hazard. The chemical quality of surface water is generally excellent; the dissolved solids concentration ranged from 25 to 450 mg/liter in 28 of the 32 streams sampled. (Woodard-USGS)
W74-00331

INFILTRATION PROPERTIES OF SOILS AND INTRAZONAL STRUCTURE OF THE HYDROLOGIC BUDGET (INFIL'TRATSIONNYYE SVOYSTVA POCHV I VNUTRIZONAL'NYYE OSOBENNOSTI STRUKTURY VODNOGO BALANSA),
For primary bibliographic entry see Field 02G.
W74-00341

RECONSTRUCTION OF THE WATER BALANCE OF LAKE BALKHASH (REKONSTRUKTSIYA VODNOGO BALANSA OZ. BALKHASH),
For primary bibliographic entry see Field 02H.
W74-00344

ESTIMATING THE PRECIPITATION CLIMATE,
Scripps Institution of Oceanography, La Jolla, Calif.
C. K. Stidd.
Water Resources Research, Vol 9, No 5, p 1235-1241, October 1973. 4 fig, 1 tab, 10 ref.

Descriptors: *Flood forecasting, *Estimating, *Droughts, *Precipitation (Atmospheric), Statistics, Rainfall-runoff relationships, Flood frequency, Statistical methods, Monte Carlo method, Data collection.

Climatic expectancies of flood or drought may be estimated from the mean and variance of a precipitation record. An interrelationship between the distributions of measurements from various observing periods allows any one of these records to be used to estimate the others. The method is based on the cube root normal distribution of precipitation and on an observed tendency for the distribution lines to be parallel. Graphs and tables are provided as an aid to making these estimates. The relationship between monthly, daily, and other measurements must be derived from the frequency spectrum of precipitation rates. This spectrum has the same profile as the theoretical spectrum for atmospheric pressure; thus the spectrum of kinematic energy regulates the relationship between precipitation distributions. (Knapp-USGS)
W74-00375

LOSS OF PARTICULATE ORGANIC MATERIALS FROM SEMIARID WATERSHEDS AS A RESULT OF EXTREME HYDROLOGIC EVENTS,
Utah State Univ., Logan. Watershed Science Unit.
G. F. Gifford, and F. E. Busby.

Water Resources Research, Vol 9, No 5, p 1443-1449, October 1973. 5 fig, 1 tab, 9 ref.

Descriptors: *Rainfall-runoff relationships, *Runoff, *Overland flow, *Nutrient removal, Floods, Organic matter, Nutrients, Deserts, *Utah.

Three debris basins in southern Utah were sampled to determine the amount of particulate organic debris deposited as a result of a single extreme runoff event on each of the three semiarid watersheds above the basins. The total quantity of large particulate organic materials lost from each contributing area ranged from 64.06 kg/ha to 12.89 kh/ha. Vegetation on the watersheds was primarily big sagebrush, pinyon, and Utah juniper. Nutrient losses due to the removal of particulate organic materials from each watershed were also approximated. (Knapp-USGS)
W74-00378

2B. Precipitation

AN ELECTRONIC SENSOR AND CIRCUIT FOR AUTOMATIC OPERATION OF RAINFALL SHELTERS,
Mississippi State Univ., State College. Dept. of Agronomy.
For primary bibliographic entry see Field 07B.
W74-00042

ESTIMATING THE PRECIPITATION CLIMATE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02A.
W74-00375

TROPICAL CYCLONE PRECIPITATION IN NEW JERSEY,
Rutgers--The State Univ., New Brunswick, N.J. Dept. of Meteorology.
E. A. Brotak, and M. D. Shulman.
New Jersey Academy of Science 'Bulletin', Vol 16, No 1-2, p 2-7 Spring-Fall, 1971. 5 fig, 6 tab, 16 ref.

Descriptors: *Tropical cyclines, Hurricanes, *New Jersey, Climatology, *Precipitation (Atmospheric), Storms, Seasonal.
Identifiers: *Cyclone precipitation.

All tropical cyclines producing measurable precipitation in New Jersey for the period 1930-1969 were analyzed to determine their origin, intensity, movement, and precipitation amounts. There were 46 such storms with most occurrences in August and September. Percentages of total monthly and annual precipitation are given for 21 selected stations scattered throughout the state. Annual percentages of precipitation caused by tropical cyclines range from 5 or 6% in the south to 3 or 4% in the north. Monthly percentages up to 40% were recorded in the southeastern part of the state for September.
W74-00435

VARIATION OF THE LOW LEVEL WINDS DURING THE PASSAGE OF A THUNDERSTORM GUST FRONT,
Pennsylvania State Univ., University Park.
R. W. Sinclair, R. A. Anthes, and H. A. Panofsky.
Available from NTIS, Springfield, Va. 22151 NASA CR-2289 Price $3.00 printed copy; $1.45 microfiche. National Aeronautics and Space Administration Contractor Report NASA CR-2289, July 1973. 65 p, 29 fig, 3 tab, 15 ref. NASA Contract NAS8-27334.

Descriptors: *Thunderstorms, *Wind velocity, *Aircraft, Shear strength, Statistical analysis, Meteorological data, *Florida, *Oklahoma, Altitude, Winds, Variability, Forecasting, Regression analysis, Atmospheric physics.

One atmospheric phenomenon that may adversely affect the operation of aeronautical systems is the cold surge or gust front accompanying thunderstorms. Three time histories of wind profiles in thunderstorm gust fronts at Cape Kennedy and three at Oklahoma City are analyzed. Wind profiles at maximum wind strength below 100 m follow logarithmic laws, so that winds above the surface layer can be estimated from surface winds once the roughness lengths is known. A statistical analysis of 81 cases of surface winds during thunderstorms at Tampa revealed no predictor with skill to predict the time of maximum gust. Some 34% of the variance of the strength of the gust is accounted for by a stability index and surface wind prior to the gust; the regression equations for these variables are given. The coherence between microscale wind-speed variations at the different levels has the same proportions as in nonthunderstorm cases. (Woodard-USGS)
W74-00545

2C. Snow, Ice, and Frost

NUTRIENT FACTORS LIMITING PRIMARY PRODUCTIVITY IN SIMULATED AND FIELD ANTARCTIC MICROECOSYSTEMS,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-00069

THE GROWTH OF PINGOS, WESTERN ARCTIC COAST, CANADA,
British Columbia Univ., Vancouver. Dept. of Geography.
J. R. Mackay.
Canadian Journal of Earth Sciences, Vol 10, No 6, p 979-1004, June 1973, 24 fig, 4 tab, 57 ref.

Descriptors: *Permafrost, *Canada, *Arctic, Freezing, Frost, Frost heaving, Silts, Lakes, Lake beds, Soil mechanics.
Identifiers: *Pingos.

The growth rates of 11 closed system pingos were measured by precise levelling of permanent bench marks anchored well down into permafrost. The rate of growth of the pingo decreases from the summit to the base, and the rate of the growth of the ice-core decreases from the center out to the periphery. The pingos grow in the bottoms of lakes which have drained rapidly and thus become exposed to permafrost aggradation. The specific site of growth is usually in a small residual pond where permafrost aggradation is retarded. The size and shape of a residual pond exercises a strong control upon the size and shape of the pingo which grows within it. The icecore thickness equals the sum of the pingo height above the lake flat and the depth of the residual pond in which the pingo grew. Pingos tend to grow higher rather than both higher and wider. Pingos are believed to grow more by means of ice segregation than by the freezing of a pool of water. The water source, and the associated positive pore water pressure, result from permafrost aggradation insands and silts in the lake bottom under a closed system with expulsion of pore water. The fastest growth rate of an icecore for the Western Arctic Coast is estimated at about 1.5 m/yr for the first 1 or 2 years. After that, the growth rate decreases inversely as the square root of time. The largest pingos may continue to grow for more than 1,000 years. At least five pingos have commenced growth since 1935. Probably 50 or more pingos are now growing along the coast. (Knapp-USGS)
W74-00098

RESULTS OF AN OPERATIONAL TEST OF M--100 RADIO-ELECTRONIC SNOW GAGES,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Z. A. Mikhaylova, and V. I. Ponomarev.
Soviet Hydrology: Selected Papers, No 4, p 320-324, 1971. 2 fig, 2 tab, 1 ref. Translated from Transactions of State Hydrologic Institut (Trudy GGI), No 189, p 83-88, 1971.

Descriptors: *Precipitation gages, *Testing, *Testing procedures, *Snow, *Snow surveys, Water equivalent, Radiation, Gamma rays, Winter, Equations.
Identifiers: USSR, Snow courses.

Operational tests were performed on 19 M-100 radio-electronic snow gages in the winter of 1968-69 to determine their basic operational characteristics and possible use as a replacement for the weighing-type snow gage. Upon elimination of constructional inadequacies and with proper operational conditions, the M-100 snow gage can be used in the Hydrometeorological Service network for snow surveys in regions with continuous snow cover. (Josefson-USGS)
W74-00109

EFFECT OF AN ERROR IN THE DETERMINATION OF THE MAXIMUM WATER EQUIVALENT OF SNOW IN A BASIN ON THE FORECAST ACCURACY OF THE SPRING FLOOD VOLUME,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
R. A. Nezhikhovskiy.
Soviet Hydrology: Selected Papers, No 4, p 324-327, 1971. 2 tab, 6 ref. Translated from Transactions of State Hydrologic Institute (Trudy GGI), No 193, p 62-66, 1971.

Descriptors: *Water equivalent, *Snowpacks, *Watersheds (Basins), *Flood forecasting, Flood discharge, Spring, Snow surveys, Correlation analysis, Equations.
Identifiers: USSR.

The acceptable accuracy with which average maximum water equivalent of snow in a basin can be determined and the effect which an error in determination of maximum water equivalent has on closeness of stochastic relations used in spring-flood forecasting are examined. With considerable variability in maximum water equivalent and flood runoff, the accuracy with which water equivalent is determined has relatively little effect on the closeness of predictive relations. An increase in the accuracy of determination of maximum water equivalent in a basin is a prerequisite for improving quality of spring runoff forecasts in northern regions. For rivers in southern regions, additional factors must be considered, including permeability of soils before start of snowmelt. (Josefson-USGS)
W74-00110

SHORT-TERM SNOW LOADS,
V. I. Lipovskaya.
Soviet Hydrology: Selected Papers, No 4, p 337-341, 1971. 2 fig, 3 tab, 9 ref. Translated from Transactions of the Voyeykov Main Geophysical Observatory (Trudy GGO), No 283, p 35-42, 1971.

Descriptors: *Snow, *Snowpacks, *Snow cover, *Loads (Forces), Weight, Density, Depth, Snowfall, Storms, Winds, Probability, Curves, Equations.
Identifiers: USSR.

Loads created by snow accumulation must be computed for short periods of time as well as for an entire winter. To estimate magnitude of short-term heavy loads, the weight of snowpack produced by great snowfalls must be considered. A snow density of 0.14 g/cu cm was assumed for the Volga Region, the southern Urals, southern West Siberia, Kazakhstan, Sakhalin, and coastal areas of the Arctic Ocean, while a value of 0.11 g/cu cm was used for all other regions. Maximum daily snow loads ranging from 15 to 115 kg/sq m

for 55 stations in European and Asiatic Russia and probability values of daily snow loads for 21 stations in the country are tabulated. (Josefson-USGS)
W74-00111

DESCRIPTION OF SNOW TRANSPORT AND SNOW DEPOSITION IN THE EUROPEAN USSR,
V. M. Mikhel', and A. V. Rudneva.
Soviet Hydrology: Selected Papers, No 4, p 342-348, 1971. 2 fig, 2 tab, 11 ref. Translated from Transactions of Main Geophysical Observatory (Tudy GGO), No 283, p 87-96, 1971.

Descriptors: Snow, *Snow cover, *Snow surveys, Winds, Winter, Probability, *Maps.
Identifiers: *European USSR, *Snow transport, Drifting snow, Blowing snow.

Patterns of snow transport and accumulation in winter during periods of blowing and drifting snow were investigated for the European part of the USSR. The volumes of snow transported and deposited over the territory vary widely and are mapped and tabulated with a probability of 5%. (Josefson-USGS)
W74-00112

DETERMINATION OF THE DURATION OF NATURAL HYDROLOGIC PERIODS,
B. A. Krutskikh, and Yu. A. Gorbunov.
Soviet Hydrology: Selected Papers, No 4, p 348-354, 1971. 3 fig, 4 tab, 8 ref. Translated from Problems of the Arctic and Antarctic (Problemy Arktiki i Antarktiki), No 38, p 22-28, 1971.

Descriptors: *Oceanography, *Hydrology, *Frequency, Time, Sea level, Water levels, Water level fluctuations, Variability, Water temperature, Salinity.
Identifiers: USSR, *East Siberian Sea, *Chuckchee Sea.

Hydrologic processes on a medium synoptic scale of 1 to 10 days are analyzed with allowance for their development and variations in time and space. An objective classification is made of space-time series of sea level, water temperature, and salinity to determine limits of unidirectional variations in elements of a sea's hydrologic regime, and a spectral analysis is made of initial data to determine duration of natural hydrologic periods more reliably. Based on investigations conducted at six polar stations in the East Siberian and Chuckchee Seas in July-October 1958-68, recurrence of low frequencies in water temperature and salinity variations is higher than for sea level. Results of determinations of recurrence periods by different methods attest to reliability of the established duration of natural hydrologic periods and can serve as a basis for further studies of processes within the limits determined on the basis of an objective classification. (Josefson-USGS)
W74-00113

DETERMINATION OF LIQUID RUNOFF FROM THE FIRN FIELD OF A GLACIER,
P. F. Shabanov, K. G. Makarevich, and Ye. N. Vilesov.
Soviety Hydrology: Selected Papers, No 4, p 363-370, 1971. 5 fig, 7 ref. Translated from Geophysical Bulletin (Geofizicheskiy Byulleten'), No 24, p 29-38, 1971.

Descriptors: *Glaciers, *Firn, *Runoff, *Snowmelt, *Water equivalent, Melting, Ablation, Ice, Infiltration, Snow surveys, Mountains, Maps, Equations.
Identifiers: *Zailiski Ala Tau (USSR), Glacier mass balance, Firn line Superimposed ice, Isolines.

Investigation of runoff from the accumulation area as well as from the tongue of mountain glaciers at middle latitudes is an important problem in modern glaciology. Investigations were conducted on the Central Tuyuksu Glacier in the Zailiski Ala Tau mountain range to obtain data on runoff from the firn basin. Surface layers of a glacier accumulation area are diagrammed, and maps of the accumulation area of the Central Tuyuksu Glacier show distribution of observation points; isolines of water equivalent of snow (mm) during maximum accumulation in winter and spring of 1966-67; isolines of water equivalent of residual snow (mm) at the end of the ablation period in 1967; and isolines of superimposed ice (mm of water depth). (Josefson-USGS)
W74-00115

EFFECT OF SALINITY ON THE OPTICAL EXTINCTION OF SEA ICE AT 6328A,
Cold Regions Research and Engineering Lab., Hanover, N.H.
H. Davis, and R. H. Munis.
Research Report 308, July 1973. 14 p, 7 fig, 4 tab, 8 ref, append.

Descriptors: *Sea Ice, *Heat balance, *Optical properties, *Light penetration, Correlation analysis, Salinity, Analytical techniques, Radiation, Wavelengths, Evaluation.
Identifiers: *Laser, Monochromatic light, Angstrom.

The penetration of shortwave radiation into sea ice is very important in specifying its heat balance. It is therefore necessary to understand the penetration of radiation of different wavelengths through sea ice under varying conditions. An investigation was made to determine the relationship between the extinction coefficient and the salinity of sea ice. A HeNe laser was used to propagate a beam of red light, of wavelength 6328 Angstroms through a series of ice samples at -20 deg C. The optical extinction coefficients were calculated and plotted against the measured salinities. The results of the experiment indicated an exponential relationship between extinction coefficient and salinity. (Woodard-USGS)
W74-00333

SOLUBLE PARTICULATES IN ICE FROM SITE 2, GREENLAND,
Nevada Univ., Desert Research Inst., Reno.
G. O. Linkletter.
Army Cold Regions Research and Engineering Laboratory Special Report 188, July 1973. 17 p, 3 fig, 5 tab, 31 ref, 2 append. NSF Grant 104.

Descriptors: *Glaciology, *Ice cover, *Chemical properties, *Polar regions, Physical properties, Sampling, Cores, Depth, Chemical analysis, Hydrologic cycle, Glaciers, Correlation analysis, Evaluation.
Identifiers: *Greenland, Ice accumulation.

Several investigators have found seasonal layering in snow in northern Greenland, and Langway (1962, 1967) has shown that certain physical and chemical parameters retain their cyclic behavior to at least 100 m depth. Collections of soluble and insoluble particles made by sublimation techniques from small pieces of polar ice are well suited for microscopic and microchemical analysis. Examination of an 89-cm vertical profile of a polar ice core from a depth of 100 m at Site 2, Greenland, indicated no seasonal cycle in the abundance of particules greater than 2 micrometers in diameter. Microchemical spot tests made on individual particles indicated the presence of NH4, K, Ca, Na and C1. Whole filter spot tests for K indicated no systematic variation in the concentration of potassium-bearing particles. Approximately 4% of the particles greater than 2 micrometers were soluble salts of Na, K, Mg, and Ca. The concentrations of Na, K, Ca and Mg were measured in melted fractions of the same core profile by atomic absorption spectrophotometry. Variation of the K concentration and variation of the number of potassium-bearing particles per gram of ice have a correlation coefficient of 0.93 over the 2.5 years of accumulation studied. (Woodard-USGS)
W74-00334

ANTICIPATED CLOSURE RATES FOR A PROPOSED DRILL HOLE, ROSS ICE SHELF, ANTARCTICA,
Cold Regions Research and Engineering Lab., Hanover, N.H.
J. Weertman.
Special Report 190, July 1973. 8 p, 3 fig, 1 tab, 17 ref.

Descriptors: *Glaciology, *Rheology, *Creep, *Antarctic, Methodology, Data collections, Drill holes, Glaciers, Movement, Velocity, Ice.
Identifiers: *Ross Ice Shelf (Antarctica).

Closure rates are calculated for the proposed drill hole through the Ross Ice Shelf, Antarctica at 166 deg W, 82 deg 30 min S. Closure rates are calculated using the best experimental data on power law creep of polycrystalline ice. Without pressurization of the drill hole closure rates greater than 0.1% per day are estimated to occur at the bottom of the drill hole. (Woodard-USGS)
W74-00335

QUATERNARY GLACIATION IN TRANSBAYKALIA (CHETVERTICHNOYE OLEDENENIYE ZABAYKAL'YA),
V. V. Zamoruyev.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya Vol 105, No 3, p 229-236, May-June 1973. 56 ref.

Descriptors: *Glaciation, *Glaciers, *Glacial sediments, *Glacial drift, *Quaternary period, Stratigraphy, Paleoclimatology, Topography, Mountains.
Identifiers: *USSR (Transbaykalia), Glacier recession, Tectonics.

Quaternary glaciation in the Transbaykal Region was of the mountain type and confined to individual mountain massifs. On the basis of generalization of available data, traditional concepts of 'maximum' Middle Quaternary glaciation must be reexamined. The presence of glacial deposits of this age cannot be considered as conclusive evidence. Existing data in the literature on traces of 'maximum' glaciation are contradictory and conflict with present data on evolution of climate and topography. Glaciation was determined by interaction of climatic and tectonic factors, of which climate was the most important. Initial stages of glaciation must be correlated with Middle Quaternary cooling. Greatest glacier development occurred at the end of Late Quaternary time, and formations developed during the maximum stage are clearly defined and relatively thick. Glacier recession in many cases was stadial in character. Glacial deposits at the time of glacier maximum development and subsequent shrinkage can be compared with the Sartanskiy horizon in the stratigraphic classification. (Josefson-USGS)
W74-00343

INVESTIGATION OF ICE MOVEMENT ON MOUNTAIN GLACIERS BY STEREOPHOTOGRAMMETRY (ISSLEDOVANIYE DVIZHENIYA L'DA GORNYKH LEDNIKOV STEREOFOTOGRAMMETRICHESKIM METODOM),
I. F. Knizhnikov.
Izadatel'stvo 'Nauka', Moscow, 1973. 106 p.

Descriptors: *Photogrammetry, *Glaciers, Mountains, *Ice, Movement, Velocity, Rates, Aerial photography, Mapping, Surveys, Measurement, Instrumentation, International geophysical year, International hydrological decade, Equations.

Identifiers: *Caucasus, *USSR (Tien Shan), *Stereophotogrammetry, Stereocomparators, Geodesy, Phototheodolites, Second International Polar Year.

Development and present state of application of terrestrial photogrammetry in glaciological investigations, and modern methods of measurement of glacier surface velocities are discussed. Attention is focused on theoretical and experimental research designed to improve the method of pseudo parallaxes employed in the measurement of ice motion at 800 points on Elbrus glaciers in the Caucasus. The rate of ice movement on Elbrus glaciers varies between several millimeters and 140 cm/day (about 0.5 km/year). On the basis of repeated phototheodolite surveys in Central Tien Shan, the rate of ice motion in terminal portions of receding mountain glaciers is several meters a year. The Zeiss phototheodolite 19/1,318 best satisfies the requirements of a glacier survey, although it is not readily adaptable to alpine conditions because of its weight. Results of a stereophotogrammetric determination on ice-movement velocities in 14 glaciers in the Caucasus and Tien Shan in 1955-63 are graphed, tabulated, and mapped. (Josefson-USGS)
W74-00346

ANALYSIS OF COUPLED HEAT-FLUID TRANSPORT IN PARTIALLY FROZEN SOIL,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
For primary bibliographic entry see Field 02G.
W74-00369

ALTERNATIVE METHODS OF ESTIMATING SNOW WATER PARAMETERS,
Idaho Univ., Kimberly. Water Resources Research Inst.
D. L. Reese, H. F. Mayland, and C. E. Brockway.
Water Resources Research, Vol 9, No 5, p 1433-1439, October 1973. 2 fig, 3 tab, 5 ref.

Descriptors: *Water yield, *Snowmelt, *Statistical methods, Regression analysis, Frequency analysis, Snowpack, Snow surveys, Water equivalent, Runoff forecasting.

A recurrence analysis technique uses probability and contingency relationships of snow depth, water equivalent, and snow density to estimate snow water. Regression techniques are based on the value from the previous month, the value from a reference site, and the month to previous month contingency parameter of the reference course. Correlation of estimated values to measured values indicated equal reliability of recurrence and regression analysis when any of the methods were used. The recurrence technique can successfully be used in estimating snow water and probability of yield. This technique like the regression technique requires a basic data set before it can be applied. (Knapp-USGS)
W74-00377

EVIDENCE OF A SURGE ON BARNES ICE CAP, BAFFIN ISLAND,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
G. Holdsworth.
Candadian Journal of Earth Sciences, Vol 10, No 10, p 1565-1574, October 1973. 8 fig, 1 tab, 22 ref.

Descriptors: *Glaciers, Movement, *Glaciation, Glaciology, *Canada, *Surges, Regimen, Arctic.
Identifiers: *Glacial surges, *Baffin Island.

A source on Barnes Ice Cap, Baffin Island is shown by several independent sources of evidence. Recently obtained and previously published flow rate, ice depth, and temperature measurements available in the region of the south dome enable a closer examination of one of the postulated surge areas on the south section of the south dome. The additional geophysical evidence is also supported by independent observations of a geological-hydrological nature in and adjacent to Generator and Flyway Lakes. It seems likely that the surge occurred in this century. The total area affected was about 240 sq km, including 'transition zones'. The increase in area of the dome was about 35 sq km in the form of the south lobe, and the increase in length of the southwest flow line was about 56%, taking account of the displaced divide. (Knapp-USGS)
W74-00537

2D. Evaporation and Transpiration

INTENSITY OF PLANT TRANSPIRATION IN CERTAIN VARIETIES AND MUTANT FORMS OF COTTON, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Pochvovediniya.
For primary bibliographic entry see Field 03F.
W74-00026

RATE OF EVAPORATION OF LOW-SOLUBILITY CONTAMINANTS FROM WATER BODIES TO ATMOSPHERE,
Toronto Univ. (Ontario). Dept. of Chemical Engineering and Applied Chemistry.
For primary bibliographic entry see Field 05B.
W74-00071

EVAPORATION RETARDATION BY MONOMOLECULAR LAYERS,
Delaware Univ., Newark. Dept. of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 03B.
W74-00373

EVAPORATION AND COOLING OF A LAKE UNDER UNSTABLE ATMOSPHERIC CONDITIONS,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
R. N. Weisman, and W. Brutsaert.
Water Resources Research, Vol 9, No 5, p 1242-1257, October 1973. 10 fig, 3 tab, 26 ref.

Descriptors: *Evaporation, *Lakes, Convection, Advection, Winds, Water temperature, Humidity, Turbulence, Boundary processes, Boundary layers, Meteorology, Mass transfer, Diffusion, Heat transfer.
Identifiers: *Lake evaporation.

Evaporation from a lake involves turbulent diffusion of momentum, sensible heat, and water vapor in the lower atmosphere when a neutral, dry air mass encounters a warm, wet surface. To calculate evaporation, the water surface temperature is specified, and the surface roughness is taken to be constant over land and water. The turbulent fluxes are formulated by a semiempirical turbulence theory with the Businger-Dyer form of the Monin-Obukhov similarity functions, a water vapor buoyancy term in the Obukhov stability length, and Blackadar's scaling height in the mixing length. The resulting solution of the equations of conservation shows that the stability discontinuity at the leading edge can greatly affect the mean rate of evaporation and that the vertical vapor flux can greatly contribute to the atmospheric stability. The solution is relatively insensitive to the exact form of the Monin-Obukhov similarity functions or to the exactness of Reynolds' analogy or von Karman's constant. For large fetches and near-neutral conditions the solution becomes similar to that obtained in Sutton's problem and with Harbeck's empirical formula. (Knapp-USGS)
W74-00374

THE TRANSPIRATION OF CORN,
Baghdad Univ. (Iraq). Coll. of Agriculture.
G. A. Al-Nakshabandi, and H. N. Ismail.
J Agric Sci. Vol 79, No 3, p 501-507. 1972. Illus.
Identifiers: *Corn, Irrigation, Neutron probes, Phaseolus-Aureus, Radiation, *Transpiration, Zea-Mays.

The actual transpiration of corn (Zea mays L.) was determined by hydraulic lysimeters, by the inflow-outflow method and by use of a neutrone probe. Two irrigation treatments were used; wet and dry. Under the wet treatment 740, 858, and 743 mm of irrigation water was used during the seasons 1968, 1969 and 1970, respectively. Under the dry treatment, irrigation water used was 560, 627 and 565 mm during the seasons 1968, 1969 and 1970, respectively. Ratios of actual transpiration (Et) to Penman's estimate of potential evaporation (Eo), evaportion from a Class-B pan (EpB), global radiation (Rg) and net radiation (Rn) were calculated. Values of Et measured by the different methods are in good agreement. Seasonal averages of Et were 6.2 and 4.9 mm/day under wet and dry treatments, respectively. The Et/Eo, Et/EpB, Et/Rg and Et/Rn ratios increased with leaf area index (L.A.I.) and reached their maximum values when L.A.I. reached its maximum value of 1.03 under wet and 0.92 under dry treatment. The empirical coefficient (f ± Et/Eo) under wet treatments was higher than that given by Penman for short grasses and about the same as that obtained by Boumans et al. for golden-gram (Phaseolus aureus) in Iraq for Aug. and Sept. The empirical coefficient Kb in the Blaney-Criddle formula was greater than the value given by Blaney and Criddle for an arid climate, and less than the value obtained by Boumans et al. for golden-gram in Iraq. Water use efficiency for grain production was greater under dry than under wet treatments.--Copyright 1973, Biological Abstracts, Inc.
W74-00467

WATER REQUIREMENTS OF WHEAT (TRITICUM AESTIVUM L.) FROM METEOROLOGICAL PARAMETERS,
Meteorological Service of Canada, Toronto (Ontario).
For primary bibliographic entry see Field 03F.
W74-00468

2E. Streamflow and Runoff

PROCESSING OF RESULTS OF OBSERVATIONS OF SPRING DISCHARGE,
Ceskoslovenska Akademie Ved, Brno. Geograficky Ustav.
H. Kriz.
Ground Water, Vol 11, No 5, p 3-14, September-October 1973. 7 fig, 9 tab, 5 ref.

Descriptors: *Springs, *Discharge (Water), *Statistical methods, Water yield, Time series analysis, Data collections, Hydrologic data, Data processing, Water measurement.
Identifiers: *Czechoslovakia.

In Czechoslovakia special methods of mathematical statistics are being used for the treatment of results of long-term observations of spring discharges. Examples are given of the statistical treatment of weekly discharges of springs issuing in the eastern margin of the Bohemian Cretaceous Plateau for the years 1901 to 1970. Besides the usual average and extreme discharges of springs, the characteristic discharge, that is the discharge exceeded for the period of n days or n percent per year, is determined. On the basis of these characteristic values it is possible to rate the individual discharges for a longer time, and with an extraordinarily high or low discharge of springs, to calculate the exceptionality of the occurrence. (Knapp-USGS)
W74-00096

DETERMINATION OF LIQUID RUNOFF FROM THE FIRN FIELD OF A GLACIER,
For primary bibliographic entry see Field 02C.
W74-00115

FLOODS IN JACKSON QUADRANGLE, MISSISSIPPI,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00302

STREAM GAUGING INFORMATION, AUSTRALIA--SUPPLEMENT 1971.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 07C.
W74-00350

HYDROLOGY AND SEDIMENT TRANSPORT, MOANALUA VALLEY, OAHU, HAWAII,
Geological Survey, Honolulu, Hawaii. Water Resources Div.
B. L. Jones, and C. J. Ewart.
Hawaii Department of Transportation, Highways Division Report No HI-HWY-71-1-II, May 1973. 111 p, 14 fig, 15 plate, 8 tab, 25 ref.

Descriptors: *Streamflow, *Sediment transport, *Hydrologic data, *Hawaii, Rainfall-runoff relationships, Model studies, Data collections, Correlation analysis, Gaging stations, Discharge (Water), Sediment yield, Particle size, Bed load.
Identifiers: *Moanalua Valley (Hawaii).

In November 1970, the State of Hawaii, Department of Transportation, entered into a cooperative agreement with the U.S. Geological Survey to study the hydrology and sedimentation characteristics of Moanalua Valley, Oahu. The primary purpose of this study is the analysis of rainfall-runoff and rainfall-sedimentation relations in a tropical watershed. This report is the first of a series of progress reports on the Moanalua Valley investigation. Preliminary results from the limited use of the U.S. Geological Survey's rainfall-runoff model have been encouraging. The calibration phase based on 10 storms produced a reasonable correlation between simulated and observed peaks. Data collected through July 1972 indicate that Moanalua Stream has a considerable capability of transporting sediment, both as bedload and as suspended sediment. Observations and calculations by the Schoklitsch formulae indicate the stream often moves material in excess of 2 feet in diameter. Calculations of suspended-sediment load, using the instantaneous relation of water and sediment discharge, resulted in a storm load of 12,000 tons for a flood similar to the design flood, or a load equivalent to 4.6 times the computed bedload discharge. (Woodard-USGS)
W74-00354

WATER RESOURCES SUMMARY, ISLAND OF HAWAII,
Geological Survey, Honolulu, Hawaii.
D. A. Davis, and G. Yamanaga.
Hawaii Division of Water and Land Development Report R47, April 1973. 42 p, 7 fig, 1 map, 5 tab, 45 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Water quality, *Hawaii, *Reviews, Hydrologic data, Stream gages, Streamflow, Rainfall, Runoff, Water yield, Groundwater, Water wells, Aquifer characteristics, Geomorphology, Perched water, Water storage, Water analysis, Hydrographs, Maps, Bibliographies.

A summary of existing information on water on the island of Hawaii is presented. Shown on the water resources map are (1) principal streams and ditches on the island and the locations of gaging stations; (2) types of occurrence of groundwater; (3) locations of principal wells, springs, and development tunnels; and (4) information on depths of wells, groundwater levels, and salinity of groundwater as indicated by chloride content. Graphs show characteristics of flow of streams at selected gaging stations and a brief description is given of development of streamflow. Brief descriptions are given of the rocks and their water-bearing properties and the occurrence, availability, and quality of groundwater. The report was compiled from published reports and records and from unpublished records in the files of the U.S. Geological Survey and the Hawaii Division of Water and Land Development. A list of selected references gives the principal publications containing information on geology and water resources of the island. (Woodard-USGS)
W74-00355

A RECONNAISSANCE OF THE WATER RESOURCES IN THE PAHSIMEROI RIVER BASIN, IDAHO,
Geological Survey, Boise, Idaho.
H. W. Young, and W. A. Harenberg.
Available from Idaho Dept. of Water Admin., Statehouse Annex 2, Boise, Idaho 83707 - Price $.50. Idaho Department of Water Administration Water Information Bulletin No 31, June 1973. 57 p, 19 fig, 10 tab, 15 ref, append.

Descriptors: *Water resources, *Hydrologic data, *Streamflow, *Groundwater resources, *Idaho, River basins, Water yield, Water quality, Discharge (Water), Sediment transport, Gaging stations, Water wells, Aquifer characteristics, Groundwater movement, Water level fluctuations, Water analysis Chemical analysis, Water utilization, Irrigation, Water supply, Livestock.
Identifiers: *Pahsimeroi River basin (Idaho).

The Pahsimeroi River basin occupies approximately 845 sq mi of east-central Idaho and is tributary to the Salmon River. The economy of the basin is dependent primarily upon livestock raising which in turn is dependent upon irrigation of lands for hay and pasture. A distinctive feature of the basin is the large interchange of water from the surface to the subsurface and back again to the surface. Water from the surrounding mountains seldom reaches the Pahsimeroi River as direct overland runoff. The Pahsimeroi River is principally a groundwater fed stream with maximum mean monthly flows occurring in November and minimum mean monthly flows occurring in May. A 7-day mean discharge in excess of 290 cfs occurs on the average of once in about 2 years; and a 7-day low mean discharge of less than about 102 cfs occurs on the average of once every 2 years. The principal aquifer is the alluvial fill from which measured well yields are as high as 3,850 gpm. The major use of water is for irrigation. In 1971, about 120,000 acre-feet of surface water and about 930 acre-feet of groundwater were used to irrigate approximately 27,000 acres. Both the surface waters and groundwaters of the basin are of good chemical quality and are suitable for all present uses. Future agricultural development in the basin must rely on the development of its groundwater supplies. (Woodard-USGS)
W74-00356

ANNUAL CYCLE IN RIVER WATER QUALITY: A TIME SERIES APPROACH,
King's Coll., London (England). Rogate Field Center.
For primary bibliographic entry see Field 05B.
W74-00372

A STREAM LENGTH STUDY,
Institute of Hydrology, Wallingford (England).
K. Blyth, and J. C. Rodda.
Water Resources Research, Vol 9, No 5, p 1454-1461, October 1973. 7 fig, 20 ref.

Descriptors: *Geomorphology, *Streams, *Drainage patterns (Geologic), Hortons law.
Identifiers: *England, *Stream lengths.

The length of flowing channel in a small clay basin in southeast England was observed once per week over a period of 1 year. The main controls of the total length of flowing channel were found to be the effective rainfall during the previous week and the length of stream flowing at the time of the previous week's observation. Variations in the lengths of streams of different orders were studied, first-order streams being found to vary most. (Knapp-USGS)
W74-00380

ON THE ANGULAR ENERGY SPECTRUM OF WIND WAVES,
Y. M. Krylov, S. S. Strekalov, and V. F. Tsyplukhin.
Izvestiya, Academy of Science, USSR, Atmospheric and Oceanic Physics, p 441-446. 5 fig, 2 tab, 14 ref. Trans. from Izv. Akad. Nauk SSSR, Fiz. Atmos. Okeana, Vol 2, No 7, 1966.

Descriptors: *Beaches, Shores, *Ocean waves, *Waves (Water), Refraction, Translation, Coasts.
Identifiers: Energy spectrum, Wind waves, Angular spectrum, Wave energy, *Near shore processes, Surf zone, *Black Sea, Wind generated waves.

The angular spectrum of deep-water wind waves and its variation in the coastal region is considered. The experimental data on the energy distribution in the angular deep-water spectrum confirm the previously suggested hypothetical dependence upon cosine squared theta. By an analysis of the field measurements and the theoretical calculations it could be shown that the angular spectrum in the narrow coastal region before the breaking zone follows the predictions of a linear hydrodynamic theory which is based on the hypothesis that the flux of wave energy is constant for the individual spectral components. (Sinha-OEIS)
W74-00505

SOME STUDIES ON WAVE REFRACTION IN RELATION TO BEACH EROSION ALONG THE KERALA COAST,
Indian Ocean Physical Oceanographic Centre of the Indian Ocean Expedition, Ernakulam.
For primary bibliographic entry see Field 02J.
W74-00506

INITIAL WAVE SCATTERING BY AN INHOMOGENEOUS MEDIUM AND ITS APPLICATION TO SHALLOW WATER WAVES,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
For primary bibliographic entry see Field 02L.
W74-00513

WAVE SHOALING,
National Engineering Science Co., Pasadena, Calif.
R. C. Y. Koh, and B. Le Mehaute.
Journal of Geophysical Research, Vol 71, No 8, p 2005-2012, April 15, 1966. 7 fig, 9 ref.

Descriptors: Shores, *Shallow water, *Energy conservation, *Waves (Water), *Coasts.
Identifiers: Stokes theory, *Wave shoaling, Progressive waves, Gravity wave theory.

The transformation of progressive waves as they travel from deep water to the shore is analyzed using the Stokes theory at a fifth order of approximation and the method of conservation of energy flux. The approximation is not uniformly valid because the wave is traveling from deep to shallow water. The first, third, and fifth orders of approxi-

mation are compared with each other and with experiments. The differences between the predictions based on the three orders of approximation are small--of the order of 5%. For most practical purposes the third-order theory would probably give the most reliable results. (Sinha-OEIS)
W74-00514

ON THE ORIGIN OF CERTAIN BREAKERS OFF THE ISLAND OF ARUBA,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
W. S. Wilson.
Available from NTIS as AD-677 052; $6.00 in paper, $1.45 in microfiche. Report No. TR-43, Ref-68-13, October 1968. 34 p, 14 fig, 5 ref. Nonr-4010)11).

Descriptors: *Beaches, Islands, *Coasts, *Waves (Water), *Refraction, Shoals.
Identifiers: *Aruba, Venezuela, Trade Winds, *Breakers, Swell.

Eastward-traveling swell developing into breakers and having a period estimated to be between 13 and 14 seconds appears intermittently along a beach on the lee side of Aruba, an island lying off the coast of Venezuela in the Trade Winds. It is suggested that waves, generated by winter storms off the mid-Atlantic coast of North America, propagate southward to Mona Passage where they are refracted in a shoal area and that they then propagate across the Caribbean Sea toward Aruba where they are refracted in a shoal area off the northwest tip of the island and arrive on the leeward coast. Evidence is presented to support this hypothesis. (Sinha-OEIS)
W74-00516

WAVE REFRACTION PATTERNS IN HAWKE BAY,
Department of Scientific and Industrial Research, Wellington (New Zealand). Oceanographic Inst.
For primary bibliographic entry see Field 02L.
W74-00518

PROCESSES AFFECTING SEAWATER CHARACTERISTICS ALONG THE OREGON COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
J. Pattullo, and W. Denner.
Limnology and Oceanography, Vol 10, No 13, p 443-450, July 1965. 4 fig, 1 tab, 10 ref.

Descriptors: *Coasts, Sea water, *Oregon, *Water temperature, *Salinity, Rainfall, *Mixing, *Columbia River, Surface waters, Water properties.

Local processes that modify surface water properties are described. Temperature and salinity data from Oregon coastal waters during 1961 and 1962 are examined to assess the effects of the various processes. The temperature-salinity pairs are divided into sets; each set is considered as dominated by a single modifying process. The set is defined by a process sector on a T-S field. The percentage of observations in each process sector is determined; these provide a basis for quantitative comparison of different samples of data. During winter, rainfall is the dominant process all along the Oregon coast. Rainfall effects were found in 72% of the winter observations. During summer, two other processes dominate: along the northern Oregon coast, mixing with Columbia River water occurred 23% of the time; near Cape Blanco, upwelling in conjunction with heating was found 42% of the time. (Sinha-OEIS)
W74-00520

WATER WAVES AT THE SHORELINE,
Wisconsin Univ., Madison. Dept. of Mathematics.
A. D. Taylor.
Available from NTIS as AD-478 688; $6.00 in paper, $1.45 in microfiche. Report No. TR-1202 (27)/3, July 1965. 54 p, 8 fig, 8 ref. ONR-1202 (27) NR-083-167.

Descriptors: *Waves (Water), *Shallow water, *Beaches, Mathematics, *Coasts, Equations, *Shores.
Identifiers: *Wave action, Bore-free motion, Laplace transform.

The nonlinear equations of two-dimensional wave motion on a shallow beach are used to study motions starting from rest and developing so that the surface elevation, at a fixed distance from the initial shore position, approaches rapidly an approximately simple-harmonic function of time. The Laplace transform is applied to a related problem and is inverted to obtain the solution of the physical problem when the water motion is bore-free. It is shown, moreover, that the solution does represent a bore-free motion for sufficiently small, non-zero amplitude, except at a set of resonant frequencies. (Sinha-OEIS)
W74-00526

SOME ASPECTS OF WAVE ACTION ON A GENTLY SLOPING SANDY BEACH,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
V. V. Longinov.
International Geology Review, Vol 6, No 2, p 212-227, February, 1964. 5 fig, 3 tab, 25 ref. Translation of: Nekotorye Dannye O Rezhimye Priboynogo Potoka Na Peschanom Plyazhe Otmelogo Berega in: Akademiya Nauk SSSR, Trudy Okeanograficheskoy Komissii. Vol VIII Morskie Berega, p 136-157.

Descriptors: *Storms, Surf, *Beaches, Shores, Coasts, *Waves (Water), *Ocean waves, Translation.
Identifiers: Surf zone dynamics, Swash, *Near shore processes, Wave action, Backwash, Pressure field.

An analysis of surf and swash action during two storms reveals the following: (1) The pressure records generated in the surf zone, and on the upper portions of the fore-shore, exhibit the sawtooth geometry predicted by theoretical analysis; (2) spacing between pressure peaks decreases down the foreshore with increasing distance from the scarp; (3) recorded pressure peaks, which are indistinguishable from those produced by discreet waves, may be generated by surf beat; (4) as the waves become higher in a coastal storm area, transverse movements of swash give backwash (pressure) effects, which do not correspond to wave and swash pressures recorded for given waves; (5) the fact that the operations were carried out on a straight stretch of fine, sandy beach with rectilinear scarp and very gentle foreshore gradient imposes radical limitations upon the generality of the results. The data were collected during 1956 at the Anapa Research Station of the Oceanographic Institute, on the Black Sea. (Sinha-OEIS)
W74-00527

RECONNAISSANCE OF THE WATER RESOURCES OF BEAVER COUNTY, OKLAHOMA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00534

FLOOD OF JUNE 1972 AT ELMIRA, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00535

DRAINAGE AREAS OF TEXAS STREAMS, LAVACA RIVER BASIN.
Geological Survey, Austin, Tex.

Open-file report, September 1973. 1 fig, 1 tab.

Descriptors: *Drainage area, *River basins, *Texas, Locating, Indexing, Mapping, Sites, Streams, Networks.

In 1951 the Federal Inter-Agency River Basin Committee, Subcommittee on Hydrology, designated the U.S. Army Corps of Engineers as the coordinating agency for the determination of drainage areas in the Arknasas and Red River basins. The U.S. Geological Survey was designated as the coordinating agency for all other river basins in Texas. These data are being compiled in cooperation with the Texas Water Development Board. Data on the drainage areas of Texas streams are being compiled so that information of uniform accuracy and reliability will be available for hydrualic, or general engineering use. This report gives the drainage areas as determined by measurements at 61 points within the Lavaca River basin. Tabulated are the latitude and longitude of the points of determination and the drainage area in square miles above each point. (Woodard-USGS)
W74-00548

RIVER MILE INDEX-SAN JOAQUIN RIVER, TULARE LAKE AND BUENA VISTA LAKE BASINS, CALIFORNIA.
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office.

Pacific Southwest Inter-Agency Committee, Water Management Technical Subcommittee report, May 1973. 121 p, 1 fig.

Descriptors: *Distance, *River systems, *Indexing, *California, Documentation, River basins, Tributaries, Drainage area, Elevation.
Identifiers: *River mile index, *Pacific Southwest, San Joaquin River basin (Calif), Tulare Lake basin (Calif), Buena Vista Lake basin (Calif).

This river mile index for the San Joaquin River, Tulare Lake and Buena Vista Lake basins, California, is one of a series of reports on stream basins in the Pacific Southwest. River mileage designations established on major streams by the Corps of Engineers or the State of California Department of Water Resources have been widely accepted for many years. These designations were used without change where they existed. River mileages for intermediate points and on other streams were determined from independent measurements made on U.S. Geological Survey topographic quadrangles. The U.S. Geological Survey furnished information on stream gage locations, drainage areas, and water elevations at key points. River mile distances were measured upstream from the mouth to the nearest tenth mile. (Woodard-USGS)
W74-00549

RIVER MILE INDEX-KLAMATH RIVER, PACIFIC SLOPE BASIN, CALIFORNIA--OREGON.
Pacific Southwest Inter-Agency Committee, Sacramento. Water Management Technical Subcommittee.

July 1973. 56 p, 1 fig.

Descriptors: *Distance, *River systems, *Indexing, *California, *Oregon, Documentation, River basins, Tributaries, Drainage area, Elevation.
Identifiers: *River mile index, *Klamath River basin (Calif and Oreg), Pacific Slope basin, Pacific Southwest.

This river mile index for the Klamath River basin in northern California and southern Oregon is one of a series of reports on major rivers in the Pacific Slope basin. This, in turn, is part of a larger program covering all the major rivers of the Pacific Southwest. Distances and other data were taken primarily from U.S. Geological Survey topographic maps. The U.S. Geological Survey Water Resources Data for California and Oregon was the source for stream gage location, height, and drainage area. Streams are designated by order number to indicate their relationship in the basin network. First order streams are main stem streams with an outlet on the sea. Tributaries to these are second order, etc. In making the index, the river mile distances were measured upstream from the mouth to the nearest tenth of a mile. (Woodard-USGS)
W74-00550

2F. Groundwater

GROUND-WATER NITRATE POLLUTION IN RURAL AREAS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05B.
W74-00095

PROCESSING OF RESULTS OF OBSERVATIONS OF SPRING DISCHARGE,
Ceskoslovenska Akademie Ved, Brno. Geograficky Ustav.
For primary bibliographic entry see Field 02E.
W74-00096

MODIFICATION OF WATER QUALITY DURING ARTIFICIAL GROUNDWATER RECHARGE,
For primary bibliographic entry see Field 04B.
W74-00116

THE DUSHANBE ARTESIAN BASIN AND ITS MINERAL AND THERMAL WATERS (DUSHANBINSKIY ARTEZIANSKIY BASSEYN I YEGO MINERAL'NYYE I TERMAL'NYYE VODY),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Geologii.
For primary bibliographic entry see Field 04B.
W74-00117

HYDRAULIC TESTING ACCOMPANYING DRILLING OF FIVE EXPLORATORY HOLES, PICEANCE CREEK BASIN, COLORADO,
Geological Survey, Lakewood, Colo.
J. E. Weir, Jr., and G. A. Dinwiddie.
Available from NTIS, Springfield, Va., 22151 as USGS-3002-2 Price $5.45 printed copy; $1.45 microfiche. Contract Report USGS-3002-2, September 1973. 55 p, 40 fig, 1 tab, 1 ref. AEC Contract No. AT (49-16)-3002.

Descriptors: *Core drilling, *Core logging, *Test wells, *Colorado, *Hydrologic data, Hydrogeology, Transmissivity, Aquifer characteristics, Water quality, Specific conductivity, Geology, Rocks, Water levels, Jets, Flow, Groundwater movement, Exploration, Watersheds (Basins).
Identifiers: *Piceance Creek basin (Colo).

Five exploratory core holes which penetrated alluvium and the Green River Formation were drilled in the Piceance Creek basin, Colorado, and hydrologic information was obtained during drilling. Transmissivity of the rocks tested was low (less than 7,500 gallons per day per foot). Field conductance of fluid discharged during drilling ranged from about 500 to about 29,000 micromhos per centimeter. General conclusions, based on comparison and evaluation of available data, are that (1) the rocks having greatest permeability penetrated by the five test holes are above the Mahogany ledge zone in the upper part of the Parachute Creek Member of the Green River Formation; (2) groundwater in the penetrated rocks becomes more mineralized with depth, noticeably at and below the Mahogany ledge zone; and (3) the test holes probably are in an area of potential groundwater discharge. (Woodard-USGS)
W74-00299

ARTIFICIAL-RECHARGE EXPERIMENTS AND OPERATIONS ON THE SOUTHERN HIGH PLAINS OF TEXAS AND NEW MEXICO,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-00325

DIGITAL SIMULATION AND PROJECTION OF WATER-LEVEL DECLINES IN BASALT AQUIFERS OF THE ODESSA-LIND AREA, EAST-CENTRAL WASHINGTON,
Geological Survey, Tacoma, Wash.
J. E. Luzier, and J. A. Skrivan.
Open-file report, 1973. 56 p, 29 fig, 12 ref.

Descriptors: *Groundwater resources, *Hydrologic data, *Washington, *Water level flucatuations, Projections, Model studies, Computer models, Analytical techniques, Water wells, Aquifer characteristics, Groundwater movement, Water yield, Water utilization, Groundwater recharge.
Identifiers: *Odessa-Lind area (Wash).

A digital computer program using finite-difference techniques simulates an intensively pumped, multilayered basalt-aquifer system near Odessa, Wash. The aquifers now developed are in the upper 1,000 feet of a regionally extensive series of basalt flows of the Columbia River Group, thousands of feet thick and having a slight southwesterly dip. Most of the aquifers are confined. Those in the depth range of about 500 to 1,000 feet are the chief source of groundwater pumped from irrigation wells. Transmissivity of these aquifers ranges from less than 2,700 sq ft per day to more than 40,000 sq ft per day, and storage coefficients range from 0.0015 to 0.006. Projected average annual rates of decline in the Odessa-Lind area during the 14-year period 1967-81 are: (1) from 1 to 9 feet per year if pumpage is maintained at the 1970 rate of 117,000 acre-feet per year, or (2) from 3 to 33 feet per year if 1970 pumpage is increased to 233,000 acre-feet per year, which includes 116,000 acre-feet per year covered by water-right applications held in abeyance. (Woodard-USGS)
W74-00326

EQUATION FOR ONE-DIMENSIONAL VERTICAL FLOW OF GROUNDWATER: 2. VALIDITY RANGE OF THE DIFFUSION EQUATION,
Centro di Ricerca IBM di Venezia (Italy).
G. Gambolati.
Water Resources Research, Vol 9, No 5, p 1385-1395, October 1973. 14 fig, 8 ref.

Descriptors: *Groundwater movement, *Consolidation, *Compaction, Land subsidence, Subsidence, Deformation, Diffusion, Equations, Aquifer testing, Porous media, Dispersion, Mathematical studies.

The reliability of the parabolic diffusion equation was investigated by solving the rigorous one-dimensional equation of groundwater flow in deforming soils. The dependence of the hydraulic conductivity on the specific weight of water is included. The grain velocity was expanded first. This expansion leads to a nonlinear integro-differential term. An iterative finite element technique of solution was then developed. The true time-dependent pressure head was compared to the standard one. The entire range of variations for the formation parameters was carefully explored. The usual equation gives satisfactory results in the vast majority of applications. The conditions underlying the approximated theory become critical only when the flow field is to be determined in highly compressible units for strong boundary pressure variations. In this case the solid material movements can no longer be considered small. The pressure head changes are faster than it would appear from the standard solution, and the consolidation process is more rapid than that in the classical Terzaghi's theory. (See also W73-13377) (Knapp-USGS)
W74-00327

DIGITAL MODEL OF THE HYDROLOGIC SYSTEM, NORTHERN HIGH PLAINS OF COLORADO--A PRELIMINARY REPORT,
Geological Survey, Denver, Colo.
R. R. Luckey, and W. E. Hofstra.
Colorado Water Resources Circular 19, 1973. 25 p, 14 fig, 6 ref.

Descriptors: *Groundwater resources, *Water level fluctuations, *Hydrogeology, Colorado, Model studies, Data collections, Correlation analysis, Projections, Water utilization, Withdrawal, Water wells, Groundwater recharge, Hydrology, Aquifers.
Identifiers: *Colorado High Plains.

The hydrologic system in part of the northern High Plains of Colorado was modeled using a finite-difference technique and a digital computer. Models were prepared for the eastern part of Kit Carson and of Yuma Counties, a total area of 2,900 square miles. The models were verified within the limits of the field data by comparing observed and simulated changes in water levels in the groundwater reservoir during 1964-71. The verified models were used to predict declines in the water table by the year 2000. The predictions indicated declines in excess of 80 feet in Kit Carson County and in excess of 90 feet in Yuma County. However, by the year 2000, Yuma County still had a large groundwater supply remaining. The models indicated that the specific yield of the aquifer and groundwater withdrawals must be more accurately determined to refine the model results. (Woodard-USGS)
W74-00330

WATER-LEVEL RECORDS, 1969-73, AND HYDROGEOLOGIC DATA FOR BACA AND SOUTHERN PROWERS COUNTIES, COLORADO,
Geological Survey, Denver, Colo.
L. A. Hershey, and T. J. Major.
Colorado Water Resources Basic-Data Release No 32, 1973. 17 p, 1 fig, 1 plate, 2 tab.

Descriptors: *Groundwater resources, *Water wells, *Water levels, *Basic data collections, *Colorado, Hydrogeology, Well data, Water yield, Aquifers, Mapping, Sites.
Identifiers: Baca County (Colo), Southern Prowers County (Colo).

Water levels measured during 1969-73 are presented for about 270 wells in Baca and southern Prowers Counties, Colo. Details are presented of location, ownership, yield, depth, and other characteristics of 165 wells inventoried. The water levels were measured by the U.S. Geological Survey and Colorado State University personnel. The study is made in cooperation with the Colorado Water Conservation Board as a part of an investigation to identify areas where the groundwater supply is being depleted. The water-level data are needed by State and local agencies to aid in administering and managing the groundwater supply. (Woodard-USGS)
W74-00332

AVAILABILITY OF WATER FROM LIMESTONE AND DOLOMITE AQUIFERS IN

SOUTHWEST OHIO AND THE RELATION OF WATER QUALITY TO THE REGIONAL FLOW SYSTEM,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 04B.
W74-00336

LAKE OKEECHOBEE SEEPAGE MONITORING NETWORK,
Geological Survey, Talahassee, Fla.
For primary bibliographic entry see Field 04A.
W74-00337

WATER-SALT BALANCE OF GROUNDWATER IN THE GOLODNAYA STEPPE IN 1969 (VODNO-SOLEVOY BALANS PODZEMNYKH VOD GOLODNOY STEPI ZA 1969 GOD),
Ministerstvo Geologii, Tashkent (USSR).
For primary bibliographic entry see Field 04B.
W74-00340

GEOLOGY AND GROUND-WATER RESOURCES OF RUSH COUNTY, CENTRAL KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 04B.
W74-00352

GROUND-WATER CONDITIONS IN UTAH, SPRING OF 1973,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 04B.
W74-00353

WATER RESOURCES SUMMARY, ISLAND OF HAWAII,
Geological Survey, Honolulu, Hawaii.
For primary bibliographic entry see Field 02E.
W74-00355

STEADY STATE GROUND MOTIONS CAUSED BY SINGLE-WELL PUMPING,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W74-00361

TIME SERIES ANALYSIS OF THE HYDROLOGIC REGIMEN OF A GROUND-WATER DISCHARGE AREA,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
R. E. Jackson, J. A. Gilliland, and K. Adamowski.
Water Resources Research, Vol 9, No 5, p 1411-1419, October 1973. 4 fig, 18 ref.

Descriptors: *Time series, analysis, *Groundwater, *Discharge (Water), *Water level fluctuations, Hydrogeology, Variability, Markov processes, Evapotransporation, Statistics, Precipitation (Atmospheric), Climates, Water balance, Hydrograph analysis, *Canada.

Time series analysis was employed to examine climatological and hydrogeological variables associated with a groundwater discharge area in Manitoba, Canada. Daily groundwater evapotranspiration and inflow rate were adequately modeled by a first-order Markov process. Nonrandom fluctuations associated with the weather and circulation of the North American summer climate were identified in the time series of mean daily temperature and groundwater evapotransporation; daily precipitation was random. Statistical filtering of the hydrogeological time series showed that two processes were associated with seasonal maximums in the groundwater evapotranspiration series, one due to the propagation of groundwater recharge through the flow system and the other due to climatic effects on the discharge area, in particular, the Lisse effect. (Knapp-USGS)
W74-00362

GALERKIN SOLUTION OF THE INVERSE PROBLEM FOR AQUIFER TRANSMISSIVITY,
Waterloo Univ. (Ontario). Dept. of Earth Sciences.
E. O. Frind, and G. F. Pinder.
Water Resources Research, Vol 9, No 5, p 1397-1410, October 1973. 11 fig, 20 ref. Canada NRC Grant A 8368.

Descriptors: *Groundwater movement, *Aquifer testing, *Transmissivity, *Finite element analysis, Numerical analysis, Equations, Mathematical models, Flow nets.
Identifiers: *Galerkin method.

The inverse problem in aquifer analysis may be solved by a Galerkin finite element approach. The proposed solution was applied to an inhomogeneous isotropic aquifer for which steady state piezometric head is known and transmissivity is unknown. The condition for existence and uniqueness of a solution is that transmissivity must be known along a line crossed by all streamlines in the flow system. In the Galerkin solution this condition may be stated alternatively in terms of flux, so that knowing the discharge at a well may satisfy the uniqueness requirement. Isoparametric finite elements were used; polynomial shape functions approximated aquifer geometry, hydraulic head, and transmissivity. The flexibility of the isoparametric elements permits using an irregular grid with nodes directly at observation points. The solution is highly sensitive to the degree of approximation in the functional representation of hydraulic head but relatively insensitive to the representation of transmissivity. The finite element solution converges to a unique solution as element size decreases. (Knapp-USGS)
W74-00363

DISPERSION-AFFECTED TRANSPORT OF REACTING SOLUTES IN SATURATED POROUS MEDIA: GALERKIN METHOD APPLIED TO EQUILIBRIUM-CONTROLLED EXCHANGE IN UNIDIRECTIONAL STEADY WATER FLOW,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05B.
W74-00364

ANALYTICAL SOLUTIONS TO THE ONE--DIMENSIONAL NONLINEAR DIFFUSION EQUATION FOR FLOW THROUGH POROUS MEDIA,
Geological Survey, Denver, Colo.
A. F. Moench.
Water Resources Research, Vol 9, No 5, p 1378-1384, October 1973. 4 fig, 3 tab, 4 ref.

Descriptors: *Diffusion, *Groundwater movement, *Numerical analysis, *Porous media, Transmissivity, Equations, Mathematical studies, Soil water movement, Saturated flow, Unsaturated flow.

The one-dimensional nonlinear diffusion equation was solved approximately by an extension of the Neumann method for a step input to a semi-infinite medium. The method of solution requires that the region under consideration be divided into an arbitrary number of zones, each zone having known constant diffusivities. The boundaries between zones move at rates that are initially unknown. Two problems were considered: (1) horizontal flow in an aquifer in which the transmissivity and storage coefficients are functions of hydraulic head and (2) horizontal absorption in an unsaturated soil for which the diffusivity is a function of moisture content. Computational results compare well with finite difference and other numerical solutions to the same problems. The technique has application to other nonlinear problems of the same type. (Knapp-USGS)
W74-00365

EXPERIMENTAL AND MATHEMATICAL MODELING OF LIQUID-LIQUID MISCIBLE DISPLACEMENT IN POROUS MEDIA,
Kansas Univ., Lawrence. Dept. of Chemical and Petroleum Engineering.
S. S. Chhatwal, R. L. Cox, D. W. Green, and B. Ghandi.
Water Resources Research, Vol 9, No 5, p 1369-1377, October 1973. 10 fig, 1 tab, 13 ref.

Descriptors: *Dispersion, *Mixing, *Groundwater movement, Saline water intrusion, Path of pollutants, Diffusion, Numerical analysis, Convection, Mathematical models, Hydraulic models.

When one liquid in a porous medium displaces a second miscible liquid of different density, both gravity effects and dispersion are present at the liquid-liquid interface. Equations describing this process were solved numerically. The method of characteristics numerical solution and a new technique (the centered in distance, centered in time method) were evaluated by direct comparison and by checking against an analytical solution for the case of one-dimensional flow. The solutions were used to simulate saltwater displacement experiments in a two-dimensional laboratory model as a further test. (Knapp-USGS)
W74-00366

DISPERSION DURING FLOW IN POROUS MEDIA WITH BILINEAR ADSORPTION,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
For primary bibliographic entry see Field 05B.
W74-00367

MODIFIED APPROACH TO CAPILLARY HYSTERESIS BASED ON A SIMILARITY HYPOTHESIS,
Technion-Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02G.
W74-00368

METHOD FOR NUMERICAL SIMULATION OF FLOW IN MULTIAQUIFER SYSTEMS,
Illinois Univ., Chicago. Dept. of Geological Sciences.
Z. A. Saleem.
Water Resources Research, Vol 9, No 5, p 1465-1469, October 1973. 2 fig, 14 ref.

Descriptors: *Simulation analysis, *Numerical analysis, *Groundwater movement, *Aquifer characteristics, Aquicludes, Artesian aquifers, Confined water.
Identifiers: Multiaquifer systems.

A model for simulation of groundwater flow in multiaquifer systems was developed. A system of nonlinear partial differential equations that are isomorphic to groundwater flow in the system was formulated in a finite difference form suitable for the line successive overrelaxation technique. The resulting system of difference equations is solved by using an efficient algorithm. The algorithm serves as a means for solving the bitridiagonal system of difference equations representing flow in two aquifers simultaneously. Storativity of the semiconfining layer can be considered indirectly or can be neglected. The results derived from the numerical simulator for the flow to wells in two coupled aquifers are in good agreement with analytical results for the same system. (Knapp-USGS)
W74-00382

ELECTRICAL RESISTIVITY SOUNDINGS ON THE COASTAL PLAIN OF SOUTHEASTERN VIRGINIA: A FEASIBILITY STUDY,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
M. A. Sabet.

Completion Report Submitted to Virginia Polytechnic Institute and State University, Blacksburg, Water Resources Research Center (1972). 17 p, 41 fig, 4 ref.

Descriptors: *Resistivity, *Coastal plains, *Aquifers, Groundwater, *Virginia, Geophysics, Electrodes.
Identifiers: Tidewater, *Schlumberger array, Dismal Swamp (Va).

A total of 39 vertical electrical resistivity soundings (VES) were made on the Coastal Plain Region of Southeastern Virginia. The Schlumberger array was used throughout the study. The maximum distance between the current electrodes was 8000 feet. Interpretation of the VES data was made by the curve matching method. Depth and resistivity parameters thus obtained were substituted in a computer program and the results were modified, by trial and error, until the calculated apparent resistivity matched the observed one. The results suggest that the maximum depths to fresh-water-bearing sands is about 40 feet in the Dismal Swamp area; it increases eastwards to 130 feet before it diminishes to 40 feet at the Atlantic Coast. To the west of the Dismal Swamp the maximum depth seems to increase progressively westwards from 55 feet at a site immediately to the west of the Swamp to 930 feet at about 50 miles from the Swamp. In the vicinity of the town of Painter on the Eastern Shore, the maximum depth of groundwater aquifers was interpreted to be between 560 and 920 feet. Alternative interpretations are given for 2 sites, in order to stress the idea that the interpretation of resistivity data is not unique.
W74-00437

ENTHALP, A COMPUTER PROGRAM FOR THE CALCULATION OF AQUIFER CHEMISTRY IN HOT-WATER GEOTHERMAL SYSTEMS,
Geological Survey, Menlo Park, Calif. Geologic Div.
A. H. Treusdell.
Available from NTIS, Springfield, Va., 22151 as PB-219 376, Price $4.50 printed copy; $1.45 microfiche. Computer Contribution (USGS-GD-73-006), March 1973. 72 p, 3 tab, 36 ref, 3 append.

Descriptors: *Geothermal studies, *Borehole geophysics, *Thermal water, *Computer programs, *Geochemistry, Water chemistry, Steam, Gases, Aquifer characteristics, Enthalpy, Systems analysis, Wells, Thermal properties, Thermodynamics, Model studies, Analytical techniques, Theoretical analysis.

This program calculates the temperature and chemical conditions in a geothermal aquifer supplying a producing bore. The input includes the enthalpy of the total fluid and the chemical analyses of water and steam separated and collected at known pressures. Alternately if a single water phase exists in the aquifer the complete analyses (including gases) of a sample collected by a downhole sampler are sufficient without a measured value of the total enthalpy. The fundamental assumptions are that the fluid is produced from a single aquifer, and is homogeneous in enthalpy and chemical composition. The calculation, necessarily involving moderately large amounts of auxiliary information and frequent iteration, is well suited to computer methods. (Woodard-USGS)
W74-00532

REGIONAL SPECIFIC YIELD OF THE EDWARDS AND ASSOCIATED LIMESTONES IN THE SAN ANTONIO, TEXAS AREA,
Geological Survey, San Antonio, Tex.
R. W. Maclay, and P. L. Rettman.
Edwards Underground Water District report, August 1973. 10 p, 3 fig, 1 tab, 4 ref.

Descriptors: *Aquifer characteristics, *Specific yield, *Limestones, *Texas, *Groundwater resources, Groundwater movement, Water wells, Water level fluctuations, Hydrographs, Observation wells, Basic data collections.
Identifiers: *San Antonio (Tex), *Edwards aquifer (Tex).

The regional specific yield in the recharge area of the Edwards and associated limestones, the principal aquifer in the San Antonio, Texas, area, is estimated to be about 0.025. This estimate is based on annual differences between recharge and discharge and on the averages of annual water-level changes in 10 observation wells in and near the outcrop area. Illustrations include: map showing recharge and artesian areas of the Edwards and associated limestones; geologic section showing the altitude of the potentiometric surface in January 1961; and hydrographs for observation wells. (Woodard-USGS)
W74-00542

2G. Water in Soils

NITRATE AND NITRITE VOLATILIZATION BY MICROORGANISMS IN LABORATORY EXPERIMENTS,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 05G.
W74-00008

SOIL DENITRIFICATION IN SEALED SOIL--PLANT SYSTEMS: II. EFFECT OF SOIL WATER CONTENT AND FORM OF APPLIED NITROGEN,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
R. C. Stefanson.
Plant Soil, Vol 37, No 1, p 129-140, 1972, Illus.
Identifiers: *Denitrification, *Nitrogen, Nitrous oxide, Soil systems, *Soil denitrification, *Soil-water-plant relationships.

The gaseous losses from N applied to the soil were measured in sealed soil-plant systems. In all treatments, large quantities of N2 and N2O were evolved into the atmosphere of the sealed growth chambers, where nitrate-N was applied; the final concentration of N2O and N2 was closely related to soil water content. Plant growth increased the final concentration of N2O and N2 in these chambers. In the presence of plants, the major component of soil denitrification was molecular N whereas in the absence of plants the main product of denitrification was N2O. Application of ammonium-N reduced the losses of soil N as N2O and N2. In ammonium-N-treated soils, the denitrification product was exclusively N, the quantity of which was not related to soil water content. N uptake by plants was low from the higher fertility sample of the Urrbrae red-brown earth, and the plant increased the soil denitrification. The reverse situation was found in the lower fertility soil sample. Some losses of soil N as ammonia nitric oxide and NO2 were found from the soil-plant system. (See also W74-00237 and W74-00025).--Copyright 1973, Biological Abstracts, Inc.
W74-00014

SOIL DENTRIFICATION IN SEALED SOIL--PLANT SYSTEMS: III. EFFECT OF DISTURBED AND UNDISTURBED SOIL SAMPLES,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
R. C. Stefanson.
Plant Soil. Vol 37, No 1, p 141-149. 1972.
Identifiers: Carbon, *Denitrification, *Nitrogen, Samples, Sealed, Soil systems, *Soil denitrification, *Soil water-plant relationships.

Dentrification was compared in disturbed and undisturbed samples of the Urrbrae red-brown earth placed in sealed growth chambers. With the soil water content at field capacity the losses of N as N2N2O averaged 1-3 mg N/kg soil/wk. This rate was maintained throughout the experimental period of 6 wk and is similar to that occurring in the field. No significant trends were observed in the final concentrations of N2 and N2O resulting from varying the form of applied N, the presence or absence of plants, the disturbance of the soil, or the rotational histories of the sites sampled. However, the combined organic C contents were similar for the A1 and A2 horizons of the soils taken from the old pasture area and continuously cropped area. (See also W74-00014 and W74-00237)--Copyright 1973, Biological Abstracts, Inc.
W74-00025

MODIFICATION OF THE WAY OF READING THE VALUES OF RESISTANCE MEASURED BY MEANS OF THE PNEUMATIC SOIL RESISTANCEMETER (PENETROMETER TYPE), (IN POLISH),
Instytut Uprawy Nowozenia i Gleboznawstwa, Pulawy (Poland).
For primary bibliographic entry see Field 07B.
W74-00051

RELATIONSHIP BETWEEN PROPERTIES AND AGRICULTURAL SUITABILITY OF SOILS: SOIL COMPLEXES: GOOD WHEAT SOILS, VERY GOOD RYE SOILS, GOOD RYE SOILS (IN POLISH),
Instytut Uprawy Nowozenia i Gleboznawstwa, Pulawy (Poland). Laboratorium Anal. Glebowych.
H. Terelak.
Pamiet Pulawski, 48, p 41-71, 1971, Illus, English summary.
Identifiers: *Agricultural soils, Barley, Oats, Rye, Soil, *Soils, Wheat, Crop yield.

Trials were undertaken both to analyze and synthesize the agricultural properties of pseudopodzolic and brown soils developed from loesses, silts, loams and sands, based on the analytical data and description of 4976 profiles of soils belonging to the following soil--agricultural complexes: good wheat soils, very good rye soils and good rye soils. Each soil profile was characterized in regard to: depth of humic horizon, percentage and total humus content, depth of carbonate occurrence, depth of acidification and deacidification, mechanical composition, texture of soil profile, soil-water condition, degree of soil culture and capability class. Based on these features, the basic agricultural properties of the investigated soil complexes were characterized. The relationship between the texture of soil profile and genetic type and the agricultural suitability of soils was determined. The criteria were more strictly defined regarding the division between the good wheat and very good rye complexes, and the good rye and the very good rye in the range of silty soils as well as loamy and sandy soils. Information is also presented regarding the yield of wheat, barley, oats, and rye on the various soil complexes.--Copyright 1973, Biological Abstracts, Inc.
W74-00054

CONTRIBUTION TO THE KNOWLEDGE OF MINERAL NITROGEN DYNAMICS IN A GREY FERRUGINOUS SOIL AT NIORO-DU-RIP (SENEGAL), (IN FRENCH),
Centre National de Recherches Agronomiques de Bambey (Senegal).
For primary bibliographic entry see Field 03F.
W74-00062

USE OF THE GAMMA FIELD OF THE EARTH TO DETERMINE THE WATER CONTENT OF SOILS,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).

N. V. Zotimov.
Soviet Hydrology: Selected Papers, No 4, p 313-320, 1971. 4 fig, 5 tab, 16 ref. Translated from Transactions of State Hydrologic Institute (Trudy GGI), No 189, p 38-48, 1971.

Descriptors: *Soil water, *Moisture content, *Radiation, *Gamma rays, Watersheds (Basins), Bogs, Bulk density, Water storage, Water levels, Instrumentation, Lysimeters, Analytical techniques, Surveys.
Identifiers: USSR.

Field experiments were performed to (1) establish a relation between gamma radiation intensity and soil water content; (2) determine the depth of soil to which this relation can be applied; and (3) develop equipment for surveys of the earth's gamma field to determine average soil water content in catchments. To determine water content at individual stations and during continuous traverse surveying, the relation of natural gamma radiation of the earth to soil water content can be used. The gamma survey method makes it possible to determine water content in soil layers to a depth of approximately 50 cm and to differentiate it by layers within limits of this depth. Under certain climatic and natural conditions, this method can be used to compute water content in the upper 100 cm of soil and in saturated soils. Construction of the relation for a specific catchment requires simultaneous measurement of the gamma field, soil bulk density, and soil water content by the thermostatic-gravimetric method. The error in determining soil water content using this method and fairly simple equipment will not exceed 5%-10%. Use of the gamma survey method to determine soil water content eliminates laborious sampling, drying, and weighing of soil, installation of sensors, and sinking of wells. (Josefson-USGS)
W74-00108

APPLICATION, UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05G.
W74-00136

MINERALOGY OF PARENT MATERIALS, TOPSOILS AND EROSION PRODUCTS OF TAITA EXPERIMENTAL STATION,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
N. Wells, and R. J. Furkert.
N Z J Sci. Vol 15, No 2, p 141-155, 1972.
Identifiers: *Erosion, Materials, *Mineralogy, *New Zeland, Products, Soils, *Topsoils.

Five parent materials from 38 sites on Taita Experimental Station were analyzed for their mineral content by rapid methods. Very strongly weathered greywacke had a low amount of feldspar and a high amount of halloysite. Four deposits of loess had compositions that related to their degree of weathering and to the presence of volcanic ash. The least weathered loess had high amounts of feldspar. Weathering of volcanic ash gave a parent material with high amounts of amorphous minerals together with some gibbsite. Topsoils analyzed from 11 soils mapped on the station had the following mineralogical character: high amounts of quartz, varying amounts of feldspar, halloysite, vermiculite, illite, interlayered hydrous mica, amorphous minerals and organic matter, with traces of gibbsite, montmorillonite, chlorite, and cristobalite. Analysis of 123 topsoil samples showed the degree of variability within the soil mapping units over the 20 ha of the Station. There was little variation in the Pinehaven silt loam form alluvium or Pomare silt loam from colluvium. Larger variations occurred in: Wingate hill soils from loess, Bucks clay loam from loess plus volcanic ash, and Tawai steepland soils from eroded weathered greywacke. The Taita clay loam from weathered greywacke with a minimum of accession varied less in its mineralogical composition than did adjacent mapping units. Erosion products analyzed were: stones from steep slopes, stones from stream beds, sandy deposits from stream beds, and silty deposits from the bottom of ponds. Stones from steep slopes had more illite than stones from streams. Sandy deposits in streams had more quartz and amorphous minerals but less feldspar than stones from streams. The mineralogy of the silty sediments from ponds was related to the nature of land use in the catchment.--Copyright 1973, Biological Abstracts, Inc.
W74-00182

SOIL DENITRIFICATION IN SEALED SOIL--PLANT SYSTEMS: I. EFFECT OF PLANTS, SOIL WATER CONTENT AND SOIL ORGANIC MATTER CONTENT,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
R. C. Stefanson.
Plant Soil, Vol 37, No 1, p 113-127, 1972, Illus.
Identifiers: *Denitrification, Diffusion, Organic matter, Oxygen, Respiration, Roots, Soils, *Soil denitrification, *Soil-water-plant relationships.

Evolution patterns and constituent components of denitrification were measured in sealed soil-plant systems. In 2 samples of the Urrbrae red-brown earth containing 1.6 and 2.3% organic C, respectively, the growth of the plant consistently increased the amounts of N2O and N2 from the soil at all water contents below field capacity. At soil water contents above field capacity, the total losses of soil N were limited in the pasture soil (organic C 2.3%) by the amount of nitrate substrate and in the crop soil by the lack of easily decomposable soil organic matter. The yields of plant tops were low in these treatments. In the presence of plants, N2 was evolved preferentially, while in their absence N2O accounts for most of the soil N loss. This trend was most pronounced in the crop soil. The pore space relationships measured at the end of the experiments showed that potential O2 diffusion pathways were more restrictive in the crop soil than in the pasture soil. The plant effect on soil denitrification was 2-fold, firstly by increasing the demand for O2 in the soil and secondly by supplying easily decomposable organic matter. (See also W74-00014 and W74-00025).--Copyright 1973, Biological Abstracts, Inc.
W74-00237

DEGRADATION OF PARATHION IN FLOODED ACID SOILS,
Central Rice Research Inst., Cuttack (India).
For primary bibliographic entry see Field 05B.
W74-00268

SALINITY STUDIES IN EAST GLADES AGRICULTURAL AREA, SOUTHEASTERN DADA COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 03C.
W74-00329

INFILTRATION PROPERTIES OF SOILS AND INTRAZONAL STRUCTURE OF THE HYDROLOGIC BUDGET (INFIL'TRATSIONNYYE SVOYSTVA POCHV I VNUTRIZONAL'NYYE OSOBENNOSTI STRUKTURY VODNOGO BALANSA),
A. M. Grin.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 103, No 5, p 463-469, September-October 1971. 5 fig, 15 ref.

Descriptors: *Infiltration, *Hydrologic budget, *Soil properties, Hydrologic properties, Permeability, Soil moisture, Soil types, Rainfall-runoff relationships, Runoff coefficient, Land use, Correlation analysis, Equations.
Identifiers: *European USSR.

The hydrologic budget of a land-use class is affected by soil physical and chemical properties, which determine the capacity of a soil to absorb, transmit, and retain water. To describe the infiltration capacity of different soils in various uses, investigations were carried out in 1962-70 in forest steppe, steppe, and southern forest zones of European Russia. An empirical relation was established between infiltration capacity of soil and surface-runoff and total-moisture values of an area. Quantitatively determined relations between soil hydrophysical properties and relation of major items in the hydrologic budget of a particular land-use class can be used in routine hydrologic forecasting and in formulating a genetic theory of river runoff formation. (Josefson-USGS)
W74-00341

THE EFFECT OF DENSITY ON WATER RETENTION PROPERTIES OF FIELD SOILS,
Soil Survey of England and Wales.
M. J. Reeve, P. D. Smith, and A. J. Thomasson.
Journal of Soil Science, Vol 24, No 3, p 355-367, September 1973. 3 fig, 6 tab, 23 ref.

Descriptors: *Bulk density, *Available water, *Retention, Clays, Soil structure, Soil management, Field capacity, Soil physical properties, Hydrologic properties, Soil texture.
Identifiers: Water retention.

The bulk density, available water, air capacity, and retained water capacity were determined for A, B, and C horizons of 158 field soils, clay, and silt. Statistical analysis of the results demonstrated that bulk density exerts a profound influence on available water, air capacity, and retained water capacity, but the effect varies between texture groups and horizons. Significant negative correlations were obtained between bulk density and air capacity for most texture and horizon groups. In B and C horizons available water and retained water capacity also decrease with increasing density, whereas in A horizons they tend to increase with bulk density. Within a limited range it is feasible to control these soil characteristics by using field techniques to achieve optimum bulk density. (Knapp-USGS)
W74-00358

OBSERVATIONS ON THE SOIL-WATER REGIMES IN A DRAINED CLAY SOIL,
Ministry of Agriculture, Fisheries and Food, Cambridge (England). Field Drainage Experiment Unit.
B. D. Trafford, and D. W. Rycroft.
Journal of Soil Science, Vol 24, No 3, p 380-391, September 1973. 6 fig, 2 tab, 17 ref.

Descriptors: *Drainage, *Clays, *Mole drainage, *Deep tillage, Drainage practices, Soil water movement, Percolation, Chiselling, Soil management.
Identifiers: England.

Soil-water profiles between drains and the associated drain-flow data were measured for the winter period on a clay soil of the Ragdale series, formed in drift over Lias clay in the Midlands of England. A water table exists and the rate of drain flow depends on whether the water table is high enough to be within layers having a better hydraulic conductivity than the normal subsoil. Mole drainage modifies the drainage performance considerably by providing a quicker disposal of water and significantly lower water table subject to much smaller fluctuations in level. Where drains are laid in the natural subsoil, without this being disturbed by deep cultivations, the water-table level is frequently close to cultivation level and there appears to be little water movement in the subsoil. For effective drainage, soils of this type require deep cultivation to modify the subsoil and allow water movement at greater depth. (Knapp-USGS)
W74-00359

SOME ASPECTS OF THE HYDRODYNAMIC DISPERSION OF SOLUTES IN POROUS MATERIALS,
Rothamsted Experimental Station, Harpenden (England).
D. A. Rose.
Journal of Soil Science, Vol 24, No 3, p 284-295, September 1973. 2 fig, 17 ref.

Descriptors: *Dispersion, *Soil water movement, *Groundwater movement, Porous media, Solutes, Leaching, Path of pollutants, Saturated flow, Mixing.
Identifiers: Hydrodynamic dispersion.

Several methods are given for analyzing the breakthrough curve of one solution as it displaces another from a column of porous material to yield a coefficient of hydrodynamic dispersion. The form of K is a function of particle size and fluid velocity in granular beds composed of solid particles or of aggregates. The effect of K on the dispersion osbserved in a column of porous material, as fluid velocity and particle size vary, may be used as an aid in assessing the efficiency of leaching. uantitative aspects of the hydrodynamic dispersion of solute which occurs under the combined influence of convection and molecular diffusion when a solution flows through a porous medium are reviewed. Solute is dispersed longitudinally relative to a plane moving with the mean velocity of flow with an apparent diffusion coefficient K termed the coefficient of hydrodynamic dispersion. The medium is considered to be a uniform bed of uniform particle size at a uniform water content. The analysis of breakthrough curves to estimate the dispersion coefficient, which treats K as a constant, is general and thus applies to both saturated and unsaturated media. (Knapp-USGS)
W74-00360

MODIFIED APPROACH TO CAPILLARY HYSTERESIS BASED ON A SIMILARITY HYPOTHESIS,
Technion-Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
Y. Mualem.
Water Resources Research, Vol 9, No 5, p 1324-1331, October 1973. 8 fig, 23 ref. USDA FG-IS-287.

Descriptors: *Unsaturated flow, *Capillary action, *Hysteresis, Soil water movement, Wetting, Drying, Capillary conductivity, Pores.
Identifiers: Capillary hysteresis.

A simplified approach to the capillary hysteresis phenomenon is based on a similarity hypothesis. A simple method predicts the relationships between the capillary head and the water content within the hysteretic loop. Only the boundary curves of the main loop are required in order to derive analytically the scanning curves. The realiability of the proposed model is demonstrated by a comparison of the predicted scanning curves with measured ones. The computed results are often in more satisfactory agreement with experiments than those obtained with the use of the general Neel-Everett model. (Knapp-USGS)
W74-00368

ANALYSIS OF COUPLED HEAT-FLUID TRANSPORT IN PARTIALLY FROZEN SOIL,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
R. L. Harlan.
Water Resources Research, Vol 9, No 5, p 1314-1323, October 1973. 5 fig, 30 ref.

Descriptors: *Soil water movement, *Heat flow, *Frozen soils, Freezing, Thawing, Mass transfer, Temperature, Numerical analysis, Equations, Infiltration, Frost, Frozen ground, Ice.

An analogy can be made between the mechanisms of water transport in partially frozen soils and those in unsaturated soils. By use of this analogy a Darcian approach may be applied to the analysis of coupled heat-fluid transport in porous media with freezing and thawing. With the aid of a numerical model, freezing-affected soil-water redistribution and infiltration to frozen soil were examined from a phenomenological point of view, and the effects of soil type and initial conditions on the response of a hypothetical soil column were studied. In general, the model shows that the rate of upward redistribution of soil water to a freezing zone at the soil surface decreases from coarse-textured soils to fine-textured soils and decreases with increase in depth to the water table. Subsequent redistribution during melting of the frost wedge occurs at a rate less than that associated with freezing. Infiltration to partially frozen soil has a significant influence on soil-water redistribution and the response of the groundwater table. (Knapp-USGS)
W74-00369

EFFECT OF INSOLUBLE GRAINS ON LEACHATE FROM POROUS BEDS,
Syracuse Univ., N. Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W74-00379

EFFECTS OF SOME SOIL CONDITIONS ON SUGAR BEET SEEDLING EMERGENCE,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
For primary bibliographic entry see Field 03F.
W74-00389

MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05B.
W74-00392

BIOLOGICAL ASPECTS OF AGRICULTURE'S EFFECTS ON ENVIRONMENTAL QUALITY,
Kentucky Univ., Lexington. Dept. of Entomology.
For primary bibliographic entry see Field 05B.
W74-00396

ENGINEERING AGRICULTURAL WASTES,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00397

SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 05B.
W74-00399

NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS,
Guelph Univ. (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 05B.
W74-00417

MANURING OF POTATOES ON FEN SILT SOILS IN HOLLAND, LINCOLNSHIRE,
Agricultural Development and Advisory Service, Cambridge (England).
For primary bibliographic entry see Field 03F.
W74-00422

CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 03C.
W74-00425

EFFECTS OF SWINE LAGOON EFFLUENT ON THE SOIL AND PLANT TISSUE,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00428

SULPHUR POLLUTION PATTERNS OBSERVED: LEACHING OF CALCIUM IN FOREST SOIL DETERMINED,
Norske Skogforsoksvesen, Oslo.
For primary bibliographic entry see Field 05B.
W74-00476

DYNAMICS OF TRACE ELEMENTS IN LIMAN--MEADOW SOILS OF THE ARID ZONE OF CENTRAL KAZAKHSTAN, (IN RUSSIAN),
Akademiya Naik Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
For primary bibliographic entry see Field 05B.
W74-00479

THE INFLUENCE OF MANURE AMELIORATION TREATMENTS ON PHYSICAL PROPERTIES OF SANDY SOIL, (IN POLISH),
Instytut Uprawny Nowozenia i Gleboznawstwa, Baborow (Poland).
For primary bibliographic entry see Field 03F.
W74-00484

A METHOD FOR DETERMINING THE BEHAVIOR OF LONG WAVES CLIMBING A SLOPING BEACH,
North Carolina State Univ., Raleigh Dept. of Civil Engineering.
M. Amein.
Journal of Geophysical Research, Vol 71, No 2, p 401-410, January 15, 1966. 7 fig, 21 ref. NBy-32236

Descriptors: *Beaches, *Coasts, Tsunamis, Shallow water, Waves (Water), Computer programs.
Identifiers: *Long waves, *Beach slopes, *Near shore processes, Explosion waves, Wave runup.

The motion of periodic long waves in shoaling water and their climb on a sloping beach are determined. One objective was the development of a method which might be useful in the investigation of tsunamis and explosion waves in coastal waters. Results are given for waves with periods ranging from 20 to 200 sec and for beach slopes ranging from 0.05 to 0.10. The propagation of long-period waves is determined by the first-order linear small-amplitude surface wave theory for regions away from the shore and by the first-order nonlinear shallow-water theory for regions near the shore. Calculations by the linear theory were made by using Friedrichs' second asymptotic representation, which is suitable for small beach slopes. Calculations by the nonlinear theory were made on a digital computer by a finite difference technique based on the method of characteristics. In the numerical method, the bre equations are coupled to the equations of the nonlinear theory, and a procedure for the calculation of the wave runup on the dry sloping beach is given. A primary objective was the development of computer programs for the application of the nonlinear theory to periodic long waves. Instantaneous dimensionless wave profiles as functions of the distance from the shore are presented for several combinations of wave periods and beach slopes. (Sinha-OEIS)
W74-00515

2H. Lakes

COASTAL CURRENTS OF THE WESTERN GULF OF MAINE,
Bureau of Commercial Fisheries, West Boothbay Harbor, Maine. Biological Lab.
J. J. Graham.
International Commission for the Northwest Atlantic Fisheries Research Bulletin, No 7, p 19-31, 1970. 8 fig, 3 tab, 16 ref.

Descriptors: *Coasts, *Upwelling, *Herrings, Ocean currents, Maine.
Identifiers: Gulf of Maine, *Coastal processes, Clupea harengus, *Near shore processes, *Wind effects, *Dynamic pressure gradients, *Shoreline configuration, Surface circulation, Coastal topography, Bottom topography.

Coastal currents during 1962-65 are described for an area extending from the headlands to 28 km offshore and from Cape Ann, Massachusetts (42 deg 39 min N, 70 deg 35 min W), to Machias Bay, Maine (44 deg 40 min N, 67 deg 20 min W). Recoveries of drift bottles confirm the major features of the surface circulation described previously by other authors. Recoveries of sea-bed drifters suggested movement of water shoreward, as well as into bays and estuaries; and along the coast for varying distances. Upwelling is the most prominent feature of the coastal circulation. Exceptions occurred at times when, (1) surface water moved inshore along a dynamic gradient within the eastern sector of the coast, (2) winds, dynamic topography at the surface, and bottom topography directed surface drift shoreward within the central and western portions of the coast, and (3) bottom water moved parallel with the coast. (Sinha-OEIS)
W74-00015

PROBABILITIES OF WAVE CHARACTERISTICS IN THE SURF ZONE,
Tetra Tech, Inc., Pasadena, Calif.
J. I. Collins, and W. Wier.
Available from the National Technical Information Service as AD-696 140, $6.00 in paper copy, $1.45 in microfiche. Report No. TT-TC-149-1, September 1969. 124 p, 23 fig, 24 ref, 3 append. ONR N00014-69-C-0107.

Descriptors: *Coasts, Shallow water, Hydrodynamics, Ocean waves, Mathematical models, Computer programs, Refraction, Waves (Water).
Identifiers: Littoral zone, *Surf zone, *Near shore processes, *Longshore currents, Energy flux, *Coastal processes, Probability distributions, Coastal topography, *Shoreline configuration.

Utilizing the hydrodynamic relationships for shoaling and refraction of waves approaching a shoreline over parallel bottom contours, a number of probability distributions for breaking wave characteristics are derived in terms of assumed deep water probability densities of wave heights, wave lengths and angles of approach. Some probability densities for wave heights at specific locations in the surf zone are computed for a Rayleigh distribution in deep water. The probability computations are used to derive the expectation of energy flux at various locations in the surf zone. A further application to determine longshore current expectation is proposed. (Sinha-OEIS)
W74-00018

THEORETICAL AND EXPERIMENTAL STUDY OF WAVE ENHANCEMENT AND RUNUP ON UNIFORMLY SLOPING IMPERMEABLE BEACHES,
Scripps Institution of Oceanography, La Jolla, Calif.
W. G. Van Dorn.
Available from the National Technical Information Service as AD-636 225, $3.00 in paper copy, $1.45 in microfiche. Report No SIO-66-11, May 1966. 101 p, 15 fig, 26 ref, 4 append, 6 infolds. NONR 2216 (16).

Descriptors: Beaches, Coasts, *Waves (Water), Shores, *Shore protection.
Identifiers: *Near shore processes, *Coastal processes, *Beach slope, Incident waves, *Dispersive wave trains, Wave profile, *Wave runup prediction, Beach slope, *Shoaling water, *Wave propagation, Wave enhancement.

The shoaling enhancement of small-amplitude, dispersive wave trains traveling over uniform, impermeable slopes was observed in a specially-constructed wave channel, where the reproducible wave elevation measurement accuracy was about 0.0005 in. These observations substantially support the enhancement predicted from linear theory (conservation of energy flux) except in very shallow water and on very steep slopes, where accelerative effects become important. On the hypothesis that small-amplitude runup theory might be similarly valid for periodic waves of finite height, provided that the positive incident wave amplitude is replaced by the local crest height above still water, this theory was modified to include the effect of the superrelevation under a wave crest due to profile asymmetry. The modified theory is shown to agree acceptably with runup observations of larger waves previously reported-both for breaking and nonbreaking waves. Because solutions to the modified theory cannot conveniently be obtained by manual calculation, a nomograph chart is included, from which runup predictions can be easily made, given only the wave height, period, and water depth a wavelength or so from shore, and the beach slope. Use of this nomograph for non-wave-length or so from shore, and the beach slope. Use of this nomograph for non-uniform slopes, oblique incidence, and non-periodic waves is also discussed. (Sinha-OEIS)
W74-00022

WAVE INDUCED CIRCULATION AND LONGSHORE CURRENT PATTERNS IN THE COASTAL ZONE,
Tetra Tech, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 02L.
W74-00023

CHARACTERISTICS OF WAVE RECORDS IN THE COASTAL ZONE,
Army Coastal Engineering Research Center, Washington, D.C.
D. L. Harris.
In: Waves on Beaches and Resulting Sediment Transport, Academic Press, p 1-51, 1972. 19 fig, 6 tab, 28 ref. Also as U.S. Army CERC Reprint 2-73.

Descriptors: *Coasts, *Beaches, *Ocean waves, *Pressure measuring instruments, *Aerial photography.
Identifiers: *Wave measuring instruments, *Wave spectra, *Surface waves, Pt. Mugu (Calif), Power spectra, *Multinodal spectra, *Near shore processes, *Coastal processes.

Records from several types of wave gages are compared to obtain a measure of instrumental reliability. Pressure records may give a better measure of surface waves than some gages which record the surface elevation directly. Spectra computed from the records of a five-gage array of pressure gages at Pt. Mugu, California, show that the true spectra consist of a group of narrow spikes, and not a smooth continuous function of frequency. Data from Pt. Mugu and several east coast stations show that multinodal spectra are common. Frequency of maximum energy density in the pressure spectra is different from surface spectra or the velocity spectra. Photographs of waves from space are used to show that long crested waves with no more than slight variation in direction do occur in the ocean. Aerial photography of a coastal region is used to show that wave conditions can vary significantly within short distances in the coastal region. (Sinha-OEIS)
W74-00033

EFFECTS OF ARTIFICIAL AERATION ON THE CHEMISTRY AND ALGAE OF TWO MICHIGAN LAKES,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 05C.
W74-00048

SOME CONSIDERATIONS OF THE CHEMICAL LIMNOLOGY OF MEROMICTIC LAKE MARY,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05C.
W74-00064

THE PROBABLE OCCURRENCE OF HYDROXYLAMINE IN THE WATER OF AN ETHIOPIAN LAKE,
Haile Sellassi I Univ., Addis Adaba (Ethiopia). Faculty of Science.
For primary bibliographic entry see Field 05A.
W74-00067

SEASONAL VARIATIONS IN SELECTED PHYSICOCHEMICAL CONDITIONS OF A SMALL LAKE IN BRAZOS COUNTY, TEXAS,
Texas Water Quality Board, Austin.
R. O. Respess, C. E. Wood, J. M. Inglis, and W. J. Clark.
Southwest Nat. Vol 17, No 3, p 249-263, 1972. Illus.
Identifiers: Lakes, Light, Physicochemical analysis, *Seasonal, Small lakes, Temperature, *Texas (Brazos County), *Dissolved oxygen, *Turbidity.

Weekly physicochemical analyses, including water temperature, dissolved O2, CO2, pH, total alkalinity, turbidity, and light transmittance were made for a 1-yr period in a lake of 0.76 ha. Dissolved O2 and temperature profiles and surface samples for chemical analysis were taken at each of seven stations. Midwater (1.5 m) and deep samples (2.7 m) for chemical analysis were taken at the 3 deepest stations. Thermal stratification persisted for about seven months of the year, and the lake was completely mixed for about 2.5 mo in winter. Below 1.8 m depth dissolved O2 was less than 1 mg/l for about 4 mo. in summer. CO2 was present in greater concentrations than has been reported for most other freshwater ponds and lakes, and the total alkalinity and pH were lower than those commonly reported. Turbidity was high and the light transmittance was influenced accordingly. Turbidity and dissolved O2 seemed to have had the most influence on the capability of the lake to support a diversified aquatic community.--Copyright 1973, Biological Abstracts, Inc.
W74-00074

QUALITATIVE AND QUANTITATIVE VARIATION OF NET PLANKTON OF CRAIGHEAD LAKE,
Oklahoma State Univ., Stillwater. Dept. of Entomology.
J. H. Nelson, and G. L. Harp.
Southwest Nat. Vol 17, No 3, p 239-248, 1972. Illus.
Identifiers: *Arkansas (Craighead Lake), Ceratium, Diaptomus, Difflugia, Distribution, Keratella, Lakes, *Plankton, Qualitative, Quantitative, Soft water.

This study describes the horizontal, vertical, and seasonal variation qualitatively and quantitatively of net plankton in Craighead Lake (Arkansas) and the co-existing physicochemical characteristics.

Further, this formation is compared qualitatively with the results obtained by Barton (1963) concerning the same lake. Craighead Lake is a soft water lake with generally adequate O2 values throughout the year, maintaining a fairly constant CO2 level and neutral pH in the upper strata. The lake is biologically poor and the 55 genera of net plankton identified constituted a mean annual standing crop of only 710 organisms/l. Total organisms varied numerically from 168/l to 2254/l on 4 Jan. and 26 April 1969, respectively. Difflugia, Ceratium, Diaptomus, and Keratella were the dominant genera, in that order. Vertical distribution of plankton was generally characterized by fewer taxa and greater numbers/l with increased depth. The most striking change in net plankton since 1962-63 was in the composition of the dominant forms. This change, and the overall paucity of plankton organisms in the present study, is largely attributed to the softness of the water and the enlargement of the lake in 1962 by extensive dredging.--Copyright 1973, Biological Abstracts, Inc.
W74-00075

CHANGES IN FAUNA OF WATER MITES (HYDRACARINA) OF KIERSKIE LAKE, (IN POLISH),
Polish Academy of Sciences, Poznan. Inst. of Zoology.
For primary bibliographic entry see Field 05C.
W74-00078

THE GROWTH OF PINGOS, WESTERN ARCTIC COAST, CANADA,
British Columbia Univ., Vancouver. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W74-00098

DISTRIBUTION OF PEAT BOGS ON EARTH, THEIR TYPES AND CHARACTERISTICS, (IN RUSSIAN),
N. Ya. Kats.
Bot Zh. Vol 57, No 2, p 198-210. 1972. Illus. English summary.
Identifiers: *Bogs (Distribution), Eurasia, Eutrophy, Flowering, North America, *Oligotrophy, *Peat bogs, Plants, Scheuchzeria, Scirpus-Caespitosus, *Sphagnum.

In temperate zones of Eurasia and North America change of peat bog types from West to East is observed. In both regions, these types are similar in some features, being distinguished from peat bogs of central parts of the continents (meridional, or West-East symmetry). Similarities are revealed in the following: on plains, peat bogs occupy great area and have thick layer of peat; oligotrophic peats are typical, they often prevail over eutrophic ones; Scheuchzeria, Scirpus caespitosus and Sphagnum, forming the basis of peat bogs, are characteristic for the vegetational cover. In coastal territories (England, Ireland and others) on blanket bogs (as well as in peat) flowering plants are abundant instead of Sphagnum. Peat bogs of temperate zones in the Northern and Southern hemispheres have similarities as well (latitude, or North-South symmetry). They are: raised surface; prevalence of Sphagnum, partly of common species, in vegetation and in peat and 3 sharp distinction in species composition of flowering plants. Symmetry of Northern and equatorial oligotrophic peat bogs (Zund Islands) is seen in following: raised surface; belt-like disposition of vegetation; very acidic peat; furrows draining central parts of bogs and taking water to the outlying ones. There is nothing common in flora. Features of symmetry in cold-temperate and warm-termperate zones (th Caucasus) of the Northern hemisphere are: raised surface; thick acidic Sphagnum-peat; common species of Sphagnum and some flowering plants.--Copyright 1973, Biological Abstracts, Inc.
W74-00147

NITROGEN SOURCES AND CYCLING IN NATURAL WATERS,
Florida Univ., Gainesville. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 05C.
W74-00149

WEED HARVEST AND LAKE NUTRIENT DYNAMICS,
North Dakota Univ., Grand Forks. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-00150

RATES OF PHOTOSYNTHESIS AND PHYTOPLANKTON GROWTH IN SHAGAWA LAKE, MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 05C.
W74-00151

EUTROPHICATION RESEARCH APPLIED TO WATER QUALITY MANAGEMENT ON THE GREAT LAKES,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 10A.
W74-00205

OCCURRENCE AND DISTRIBUTION OF HELMINTH PARASITES OF FISHES FROM LAKE CARL BLACKWELL, OKLAHOMA,
Oklahoma State Univ., Stillwater.
For primary bibliographic entry see Field 05B.
W74-00230

FRAZER LAKE SOCKEYE INVESTIGATIONS, 1970,
Alaska Dept. of Fish and Game, Kodiak. Research Section.
For primary bibliographic entry see Field 08I.
W74-00232

EFFECTS OF ARTIFICIAL DESTRATIFICATION ON ZOOPLANKTON IN PARVIN LAKE, COLORADO,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
For primary bibliographic entry see Field 05C.
W74-00243

LAKE HURON: EFFECTS OF EXPLOITATION, INTRODUCTIONS, AND EUTROPHICATION ON THE SALMOID COMMUNITY,
Department of Lands and Forests, Maple (Ontario). Research Branch.
For primary bibliographic entry see Field 05C.
W74-00244

PHYSICAL AND CHEMICAL LIMNOLOGY OF LAKE LEAKE AND TOOMS LAKE, TASMANIA,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00283

POLLUTED SNOW IN SOUTHERN NORWAY AND THE EFFECT OF THE MELTWATER ON FRESHWATER AND AQUATIC ORGANISMS,
Oslo Univ. (Norway). Zoological Lab.
For primary bibliographic entry see Field 05C.
W74-00287

LAKE OKEECHOBEE SEEPAGE MONITORING NETWORK,
Geological Survey, Talahassee, Fla.
For primary bibliographic entry see Field 04A.
W74-00337

NEW DATA ON HYDROLOGIC REGIMEN OF LAKE SARYCHELEK (NOVYYE DANNYYEE PO GIDROLOGICHESKOMU REZHIMU OZ. SARYCHELEK),
O. P. Shcheglova, and A. Kh. Tulyaganov.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 103, No 5, p 418-424, September-October 1971. 6 fig, 1 tab, 9 ref.

Descriptors: *Lakes, *Regimen, *Hydrologic cycle, Water balance, Inflow, Discharge (Water), Lake morphometry, Water levels, Thermal properties, Temperature, Thermal stratification, Turnovers, Water chemistry.
Identifiers: *USSR (Lake Sarychelek).

Hydrological and meteorological observations were carried out in 1964-65 on Lake Sarychelek, the third deepest lake in Soviet Central Asia. According to latest figures, the morphometric parameters of the lake are: length--7.5 km; maximum width at the dam--2,280 m; mean width--650 m; surface area--4.92 sq km; maximum depth--234 m; volume--0.483 cu km; and mean depth--98 m. The annual range of water levels in the lake during the period of observations was 43 cm. At the end of April after ice breakup, the water surface temperature approaches 0 deg C. Maximum water surface temperature at the shore (19.8 deg C) was recorded on August 25, 1965. Annual temperature cycle in the lake extends to a depth of about 30 m. A year-round inverse temperature structure is observed below 30 m. The temperature of water at the bottom of the lake is about 5 deg C. (Josefson-USGS)
W74-00342

RECONSTRUCTION OF THE WATER BALANCE OF LAKE BALKHASH (REKONSTRUKTSIYA VODNOGO BALANSA OZ. BALKHASH),
A. V. Shnitnikov.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 105, No 3, p 223-228, May-June 1973. 4 tab.

Descriptors: *Lakes, *Water balance, Inflow, Discharge (Water), Precipitation (Atmospheric), Evaporation, Water levels, Water types, Water resources, Dams.
Identifiers: *USSR (Lake Balkhash), Ili River.

Owing to unfavorable natural trends in water resources development and removal of part of the Ili River runoff for economic purposes, the water regime of Lake Balkhash is acquiring properties that are highly detrimental to branches of the national economy which depend on the lake waters. From the State point of view, this situation must be remedied. One solution is to divide the lake into three pools separated by two dams: the Western Balkhash and Lepsa-Karatal (Eastern Balkhash) freshwater pools; and the Central or Algazy salinewater pool, which will receive the surplus water of the other two pools. Water-balance computations fully justify such reconstruction and conservation of Lake Balkhash as a major water body. (Josefson-USGS)
W74-00344

EVAPORATION AND COOLING OF A LAKE UNDER UNSTABLE ATMOSPHERIC CONDITIONS,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 02D.
W74-00374

OBSERVATIONS ON THE NITROGEN FIXING POTENTIAL OF THE SURFACE WATERS OF A LARGE IMPOUNDMENT,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-00436

ECOLOGY AND PRODUCTION OF THE PROFUNDAL BENTHOS IN RELATION TO PHYTOPLANKTON IN LAKE ESROM,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
For primary bibliographic entry see Field 05C.
W74-00466

THE DYNAMICS OF A GROUP OF PERCHES, PERCA FLAVESCENS (MITCHILL) IN THE GRANDE-ANSE COVE OF PERROT ISLAND IN SAINT-LOUIS LAKE, (IN FRENCH),
Montreal Univ. (Quebec). Dept. of Biological Sciences.
R. Fortin, and E. Magnin.
Nat Can (Que). Vol 99, No 4, p 367-380. 1972. Illus. (English summary).
Identifiers: *Canada (Saint Louis Lake), Coves, Islands, Lakes, Perca-Flavescens, *Perches, Tagging, Spawning.

In 1968 and 1969, 9396 perches were tagged on their spawning grounds in Grande-Anse of Ile Perrot, Canada. To date, 378 specimens were recaptured by anglers and 63 by biologists. Mean distances from the release point are small: 1.9 km under the ice and 3.9 km in open waters: this demonstrates the sedentary character of these fish. The number of eggs varied from 8000-29,000 for females measuring 190-300 mm. The annual rate of survival (s) for fish of age group VI and older was 54%. The rate of catch per angler and per hour was 0.5 perch during the winter and 4.2 perches in open waters. The annual rate of exploitation was 3.4%. The population density for fishes measuring 190 mm and more was estimated as being 268,000 individuals; the corresponding biomass for Grande-Anse is 21.4 kg/ha. The yield per 1000 g of recruits measuring 161 mm (2 and 1/3 yr old) was 124 g.--Copyright 1973, Biological Abstracts, Inc.
W74-00470

ESTIMATION OF FISH PRODUCTION IN THE VOLGOGRAD WATER RESERVOIR, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Saratov (USSR).
T. K. Nebol'sina, and V. P. V'yushkova.
Zool Zh. Vol 51, No 8, p 1255-1257. 1972. (English summary).
Identifiers: *Fish production, Phytoplankton, Reservoirs, *USSR (Volgograd reservoir), *Primary production.

An attempt was undertaken to estimate fish productivity through the estimation of productive processes taking place in the water reservoir. The value of used organic substances in the fish derived from primary production and phytoplankton was estimated to be 0.29%.--Copyright 1973, Biological Abstracts, Inc.
W74-00480

ROLE OF ULTRANANNOPLANKTON ALGAE IN PRIMARY PRODUCTION IN LAKE BAIKAL DURING THE SUMMER, (IN RUSSIAN),
K. K. Votintsev, A. I. Meshcheryakova, and G. I. Popovskaya.
Gidrobiol Zh. Vol 8, No 3, p 21-27. 1972. Illus. (English summary).
Identifiers: *Algae, Dinobryon, Gymnodinium, Lakes, Melosira, *Nannoplankton, Photosynthesis, Plankton, *Primary production, Summer, Syndetocysis, *USSR (Lake Baikal).

The results of investigations on productive capacity of ultranannoplanktonic algae in Lake Baikal (USSR) are considered. Their great significance in the total biomass of vegetative plankton as well as high photosynthetic activity are established. The role of these organisms is essential in the production process of Lake Baikal. Genera encountered include Dinobryon, Gymnodinium, Melosira and Synchetocystis.--Copyright 1973, Biological Abstracts, Inc.
W74-00488

ROLE OF BACTERIA IN THE FEEDING OF ZOOPLANKTON OF THE DNIEPER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk USSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 05C.
W74-00496

HYDROBIOLOGICAL INVESTIGATION OF LAKE LERE AND NEIGHBORING PONDS: I. THE PHYSICAL ENVIRONMENT, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamy (Chad).
C. Leveque.
Cah ORSTOM (Off Rech Sci Tech Outre-Mer) Ser Hydrobiol. Vol 5, No 2, p 161-169. Illus. 1971. English summary.
Identifiers: Biomass, *Chad (Lake Lere), Environment, *Hydrobiological studies, Invertebrates, Lakes, Ponds, *Rotifera.

A limnological investigation of Lake Lere (Chad) (9 deg 37 min N-14 deg 10 min E) was made in Feb. 1970. The bathymetric study shows that this lake is shallow (6m), with flat bottom and can be classsified as a flat tropical lake. Ca is the abundant salt in the water, but the general salt content is low (conductivity: 89 micro mhos). The bottom is homogeneous and essentially muddy. At the time of the study, Rotifera were the main zooplankton. Other invertebrates and the benthic biomass are analyzed. --Copyright 1973, Biological Abstracts, Inc. (See also W74-00502)
W74-00501

HYDROBIOLOGICAL INVESTIGATION OF LAKE LERE (CHAD) AND NEARBY PONDS: IV. THE BENTHIC FAUNA,
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamay (Chad).
C. Dejoux, L. Lauzanne, and C. Leveque.
Cah ORSTOM (Off Rech Sci Tech Outre-Mer) Ser Hydrobiol. Vol 5, No 2, p 179-188. Illus. 1971.
Identifiers: *Alluroides, *Bellamya-Unicolor, *Benthic Fauna, *Chad (Lake Lere), Ephemeroptera, Hydrobiological studies, Lakes, Ponds, Trichoptera.

Lake Lere is characterized by a lack of benthic endemics, which is to be expected considering that it marks an area of transition from the Chad to the Niger Basins. However, Lake Lere had fewer species than Lake Chad. Particulary evident is the absence of Ephemeroptera and Trichoptera, Alluroides worms, and Bellamya unicolor mollusks. Considering the small number of benthic species and the homogeneity of the environment (sediment, physicochemistry of the water), Lake Lere constitutes a much more simple aquatic ecosystem than Lake Chad.--Copyright 1973, Biological Abstracts, Inc. (See also W74-00501)
W74-00502

2I. Water in Plants

SOIL DENITRIFICATION IN SEALED SOIL--PLANT SYSTEMS: II. EFFECT OF SOIL WATER CONTENT AND FORM OF APPLIED NITROGEN,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
For primary bibliographic entry see Field 02G.
W74-00014

SOIL DENTRIFICATION IN SEALED SOIL--PLANT SYSTEMS: III. EFFECT OF DISTURBED AND UNDISTURBED SOIL SAMPLES,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
For primary bibliographic entry see Field 02G.
W74-00025

ECOLOGICAL AND FLORISTIC CONVERGENCES BETWEEN SEASONAL PLANT FORMATIONS OF TROPICAL AND SUBTROPICAL SOUTH AMERICA,
Universidad de Los Andes, Merida (Venezuela). Facultad de Ciencias.
G. Sarmiento.
J Ecol. Vol 60, No 2, p 367-410, 1972. Illus.
Identifiers: Canopy, Diversity, Ecological studies, Floristic studies, Generic composition, Layering, Morphology, Rainfall, *Seasonal, *South America, Subtropical, Taxa, *Tropical, Woody plants.

Four tropical seasonal formations of the Caribbean area of northern South America were compared with 9 seasonal subtropical types occurring in southern South America. Considered were: number of woody families and genera; generic composition; floristic elements; generic diversity; layering; leaf size and leaf type of canopy layer species; number of woody genera with thorny, succulent and aphyllous representatives; mean annual rainfall and number of dry months. The tropical American formations are floristically richer than their equivalent subtropical types; alpha-diversity decreases toward the arid extremes of each series, but in a more irregular way in the subtropical group. Tropical elements predominate in the less seasonal types of both series, whereas the most seasonal formations have a more heterogeneous flora from the distributional viewpoint. A 2-axis ordination of the 13 types is given, showing the relative floristic affinity between them. The Gallery forest of the Parana-Paraguay rivers is the subtropical type closely related to the tropical seasonal formations. Subtropical units are lower and structurally simpler than tropical types occurring under equivalent climate. Each subtropical formation compares best with a more seasonal tropical type. In the subtropical area, the mixed character of leaf type is more evident when only the dominant species in each formation are considered. Subtropical types have significantly smaller leaf sizes, while the proportion of taxa showing xeromorphic features is greater than in the Caribbean types. The group of seasonal formations in the subtropical area varies irregularly, probably due to the combined action of the 2 main environmental stresses: drought and cold.--Copyright 1973, Biological Abstracts, Inc.
W74-00066

SOME CHARACTERISTICS OF NECTAR PRODUCTION IN THE MOUNTAIN HONEY PLANTS OF NORTHERN FERGANA (IN RUSSIAN),
For primary bibliographic entry see Field 03F.
W74-00235

SOIL DENITRIFICATION IN SEALED SOIL--PLANT SYSTEMS: I. EFFECT OF PLANTS, SOIL WATER CONTENT AND SOIL ORGANIC MATTER CONTENT,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
For primary bibliographic entry see Field 02G.
W74-00237

LIMITING STEPS IN PHOTOSYSTEM II AND WATER DECOMPOSITION IN CHLORELLA AND SPINACH CHLOROPLASTS,
Institut de Biologie Physico-Chimique, Paris (France).
For primary bibliographic entry see Field 05C.
W74-00238

THE EFFECTS OF CARBON DIOXIDE CONCENTRATION ON OXYGEN EVOLUTION AND FLUORESCENCE TRANSIENTS IN SYNCHRONOUS CULTURES OF CHLORELLA PYRENOIDOSA,
Rochester Univ., N.Y. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-00239

THE AMINO ACID AND SUGAR COMPOSITION OF DIATOM CELL-WALLS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05C.
W74-00240

ORIENTATION OF CHLOROPHYLL IN VIVO. STUDIES WITH MAGNETIC FIELD ORIENTED CHLORELLA,
New York Univ., New York. Radiation and Solid State Lab.
For primary bibliographic entry see Field 05C.
W74-00245

RUNOFF FORMATION ON MOUNTAIN SLOPES UNDER CARPATHIAN BEECH AND SPRUCE FORESTS,
For primary bibliographic entry see Field 04A.
W74-00338

SPRING RUNOFF FROM SMALL CATCHMENTS WITH DIFFERENT FOREST COVER IN THE MOUNTAINS OF GEORGIA,
For primary bibliographic entry see Field 04A.
W74-00339

LOSS OF PARTICULATE ORGANIC MATERIALS FROM SEMIARID WATERSHEDS AS A RESULT OF EXTREME HYDROLOGIC EVENTS,
Utah State Univ., Logan. Watershed Science Unit.
For primary bibliographic entry see Field 02A.
W74-00378

NUTRIENT LOSSES AFTER CLEAR-CUT LOGGING AND SLASH BURNING IN THE OREGON COAST RANGE,
Oregon State Univ., Corvallis. School of Forestry.
For primary bibliographic entry see Field 04C.
W74-00381

DIFFERENCES IN LITTORAL FAUNA DUE TO FLUCTUATING WATER LEVELS BELOW A HYDROELECTRIC DAM,
Amherst Coll., Mass. Dept. of Biology.
S. G. Fisher, and A. Lavoy.
J Fish Res Board Can. Vol 29, No 10, p 1472-1476. 1972. Illus.
Identifiers: *Chironomid, *Connecticut River, Dams, Hydro electric plants, Littoral fauna, *Mollusk, *Oligochaete, River, *Water level fluctuation, Invertebrates.

Water level fluctuations below a hydroelectric dam on the Connecticut River produce a freshwater 'intertidal' zone. Along a transect in this zone from high to low water mark benthic invertebrates increased markedly in density and toxonomic diversity. Communitycomposition shifted from chironomid-oligochaete predominance on the most exposed sites to mollusk predominance on the least exposed sites.--Copyright 1973, Biological Abstracts, Inc.
W74-00463

SYNOPSIS ON THE BIOLOGY OF THE SHRIMP OF RIO DEL NORTHE (CHILE), (IN SPANISH),
Chile Univ., Santiago. Departamento de Biologia.
N. Bahamonde, and I. Vila.
Biol Pesq (Chile). 5. p 3-59. 1972. Illus. (English summary).
Identifiers: Biology, *Chile (Rio-Del-Norte), *Shrimp, Synopsis.

A synthesis of the data known about the shrimp of the Northern rivers (Cryphiops caementarius Molina) the only representative of the Palaemonidae family, which can be found in Chile is given. The area of dispersion lies between the river Maipo, Chile, towards the South and the Peruvian spas of the central Southern regions. During the day, the shrimp stays in the deepest parts of the river, either among or under the stones, or it seeks hiding places among the aquatic plants. At dusk, the shrimp increases its activity, moving to shallow places in search of food. It is omnivorous and in a gastric analysis, different remains of Clorophyceae, Cyanophyceae, diatoms, Gastropoda, Mollusca, larvae, Coleoptera and copepod Cyclopoidea were found. Some specimens have reached a cephalothoracic length of 57 mm. (Limari River); the minimal size for females in spawing is 7.2 mm. in the Estero El Culebron; and 14.3 mm. in river Limari; both sizes are bigger than the specimens observed in Peru. The diameter of the eggs varies from 0.54-0.84 mm. The principal area of birth is generally near the river's mouth. The period of spawning goes from Sept. to May, with higher percentages in Dec., Jan. and Feb. There are some variations according to the hydrographic system that was analyzed. The methods of catching, culture, and fishing control are discussed. The relation between size and weight, sexual dimorphism and composition of the populations studied in the river Limari and stream El Culebron, in Chile is indicated.--Copyright 1973, Biological Abstracts, Inc.
W74-00471

WATER CONTENT IN A PHYTOCOENOSIS, AND WATER BUDGET OF A ECOSYSTEM; OAK-FOREST OF VIRELLES, (IN FRENCH),
Brussels Univ. (Belgium). Laboratoire de Botanique Sysetematique et d'Ecologie.
G. Schnock.
Oecol Plant. Vol 7, No 3, p 205-226. 1972. Illus. (English summary).
Identifiers: *Belgium (Virelles), Drought, Ecosystem, Forests, *Oak forest, *Phytocenosis, Seasonal rhythm, *Water budget.

During the vegetative period, the moisture content of trees decreases during the warm daytime and increases during the nighttime. Besides the daily rhythm, there exists a seasonal rhythm closely related to the tree physiology, successively: important and generalized increment of the moisture content during the buds swelling period; decline, at first rapid, during the foliation stage, afterward slower until the end of the vegetative period; rehydration of trunks and limbs during the coloration and defoliation stage; relatively stable and homogeneous moisture content in all tree parts in winter season. Moisture and drought periods can induce temporary fluctuations of the moisture content of trees. The more the organs are young and functional, the more the water content is high and the more the fluctuations are important. During the whole vegetative period, the water content of the forest of tall trees has increased from 9.7 to 10.5 mm; it is running to 11 mm for the phytocenose (Wp ± community water content) and delta Wp reaches + 1.8 mm (leafy stage) and--0.6 mm (leafless stage).--Copyright 1973, Biological Abstracts, Inc.
W74-00474

THE EVOLUTION OF A DISCRETE BEAVER HABITAT IN THE MACKENZIE RIVER DELTA, NORTHWEST TERRITORIES,
Alberta Univ., Edmonton. Dept. of Geography.
D. Gill.
Can Field Nat. Vol 86, No 3, p 233-239. 1972. Illus.
Identifiers: *Beaver habitats, *Canada (N.W.T., Mackenzie River), Castor-Canadensis, *Deltas, Evolution, Populus-Balsamifera, Rivers, Seral community.

The in situ sequence of physical and biological events that creates a discrete beaver (Castor canadensis kuhl) habitat in the Mackenzie River Delta is traced through time. Fluvial and sedimentation processes along a shifting channel create an environment that is conducive to the colonization of a poplar (Populus balsamifera) seral community. Depressions formed immediately inland from such sites may be colonized by beavers, after which they are adjacent to a large and preferred food source. Selective use by beavers may locally alter the flora to maintain a zootic climax until the site is abandoned. After abandonment, poplar regeneration may once again attract beavers so that a cyclic pattern of use is established.--Copyright 1973, Biological Abstracts, Inc.
W74-00481

COMPARATIVE CHARACTERISTICS OF ECOLOGICAL CONDITIONS IN ANNUAL CLEARING AND UNDER A CANOPY IN DRY COTINUS OAK WOODS, (IN RUSSIAN),
A. I. Vainshtein.
Izv Akad Nauk Mold SSR Ser Biol Khim Nauk. 2. p 9-15. 1972. Illus.
Identifiers: Annual, Canopy, Clearing, *Cotinus, Ecological studies, Evaporation, Light, Moisture, *Oak, *Quercus-Petraea, Soils, Temperature, Transpiration,.

Under conditions of dry Cotinus oak woods of Quercus petraea Liebl., as in fresh types, removal of wood leads to a change in the microclimate of the clearing. However, as a result of thinning of the leaf canopy in sub-crown area, dry conditions are introduced, thus reducing the contrast of microclimatic indices in the woods and in the clearing. In the woods, at noon, an average 63% of the total short-wave radiation and 56% of light energy passes into the clearing through the tree canopy after the vegetation season. The largest difference between temperature indices in the woods and in the clearing is observed in hours of maximum heating. Air is heated on the forest floor, and soil to a depth of 5 cm. Indices of water regime under the forest canopy and in the clearing differ in the course of a whole season; however, this difference varies depending on transpiration of the stand and underbrush, in the surface layers also on physical evaporation, and also on summer deposits. Over the course of the entire vegetation season, the soil layer is parched under the forest canopy at a depth of 100-160 cm, i.e., in the main zone of concentration of root systems of trees and underbrush.--Copyright 1973, Biological Abstracts, Inc.
W74-00487

LITTER DECOMPOSITION IN THE EVERGREEN RAIN-FOREST OF IVORY COAST, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast).
F. Bernhard-Reversat.
Oecol Plant. Vol 7, No 3, p 279-300. 1972. Illus. (English summary).
Identifiers: Arthropods, Calcium, Decomposition, *Evergreen rain forest, *Ivory Coast, *Litter decomposition, Magnesium, Microbial activity, Phosphorus, Potassium, Rain.

Litter break down was studied in a rain forest of south Ivory Coast at 2 sites: a plateau and a talweg. Litter disappeared within 5 mo. in the talweg;

on the plateau, the time for total disappearance was about 9 mo. The curves of amount remaining versus time are different from the exponential theorical ones. Analyses showed mineral nutrient losses from the litter. The order of decreasing mobility was K, P ± Mg and Ca. The role of some factors was studied. Decomposition rate is greatly dependent on plant species. Mineral nutrient content of leaves was less important than site. The site is an important factor in litter decay; this is partly due to the top soil features and its microflora. Microbial activity in litter is independent on leaf age, the respiration rate is high in freshly fallen leaves, and then decreases greatly. Artificial leaching of the litter showed a rapid loss of the nutrients used by microflora. Litter arthropod number is maximum during the wet season; the role of arthropods in litter decay is variable and difficult to study.--Copyright 1973, Biological Abstracts, Inc.
W74-00494

STUDIES ON THE BIOLOGY AND CONTROL OF VAUCHERIA DICHOTOMA FOUND IN FRESHWATERS IN BRITAIN,
Ain Shams Univ., Cairo (Egypt). Faculty of Education.
A. R. Dowidar, and T. O. Robson.
Weed Res. Vol 12, No 3, p 221-228, 1972, Illus.
Identifiers: Chlorophyll, Diquat, Growth, Herbicides, Nutrients, Reproduction, *Vaucheria-Dichotoma, *Algae, *Great Britain (Oxford).

V. dichotoma Ag. plants were collected from a ditch near Crowland and from the River Cherwell at Oxford (England). A nutrient medium is described which allows the growth and sexual reproduction of this alga. Preliminary studies on the control with diquat show that it must be exposed to a concentration of 2 mg/l for 6 hr for the herbicide to be effective. The presence of mud reduces the rate at which chlorophyll disintegrates and hastens the inactivation of diquat.--Copyright 1973, Biological Abstracts, Inc.
W74-00541

2J. Erosion and Sedimentation

DOUBLE-HUMPED WAVES ON A SLOPING BEACH,
Hawaii Inst. of Geophysics, Honolulu.
J. P. Butler.
Report HIG-67-16, August 1967. 29 p, 6 fig, 5 ref. Also as ESSA-JTRE-2.

Descriptors: *Waves (Water), *Beaches, *Erosion, *Deposition (Sediments), *Shallow water.
Identifiers: *Wave action, *Beach slope, Wave propagation.

The nonlinear shallow water theory in two dimensions has been used to compute the behavior of selected wave shapes on sloping beaches. These waves all are initially at rest with two humps of specified heights. An analytic solution is found for the behavior of the wave height and velocity at the shoreline. Particularly interesting are the amplifications of the respective humps, when related to the wave shape. Numerical techniques are used to find the general behavior of the wave off the shoreline. (Sinha-OEIS)
W74-00016

A TIME SERIES FROM THE BEACH ENVIRONMENT,
Atlantic Oceanographic and Meteorological Labs., Miami, Fla.
W. Harrison, E. W. Rayfield, J. D. Boon, III, G. Reynolds, and J. B. Grant.
Technical Memorandum ERLTM-AOL-1, January 1968. 28 p, 4 fig, 4 tab, 14 ref, 9 plates, 3 append.

Descriptors: *Beaches, *Time series analysis, *Waves (Water), Rainfall, Water temperature, Air temperature, Winds, Sands, *Sediment transport, Virginia.
Identifiers: Virginia Beach, *Coastal processes, *Near shore processes, Radiant energy, Wind speed, Longshore currents, Breakers, Bottom topography.

A continuous, 26-day series of measurements of the following variables was made at Virginia Beach, Virginia, during August and September, 1966: depth of the water table in the foreshore, altitude of the foreshore surface, tidal elevation, angle between breaker crest and shoreline, height of breaking waves, period of breaking waves, rainfall, radiant energy balance over water, water temperature, air temperature, wind speed, wind direction, velocity of longshore current, position of the top of the uprush, position of the inshore margin of the breaker zone, and the height and period of significant waves 240 m offshore. Water and sand samples were also collected. Additional measurements derived from the samples or field data consisted of: significant breaker height, foreshore slope, quantity of foreshore sand eroded or deposited in one tidal cycle, mean time for sand samples to fall 1.0 m in fresh water, nominal grain diameter and sorting coefficient of foreshore samples, length of unsaturated foreshore surface from outcrop of water table to swash reach, length of saturated foreshore surface from water table outcrop to trough in front of breaking wave, elevation of water table outcrop above trough level at breaking, rate of rise or fall of the tidal plane, density of the sea water, and relative density of midforeshore sand grains. Most of the variables were measured every 4 hr; a few were measured every 6.25 hr, at times of high or low water, and three variables were measured continuously. Plots of the variables were prepared, smooth curves drawn, and the curves digitized using 1-hr interval. A listing of the basic time series is presented, together with details of measurement techniques, analytical procedures, and operational definitions for each variable. (Sinha-OEIS)
W74-00017

QUARTERNARY BEACHES AND COASTS BETWEEN THE RUSSIAN RIVER AND DRAKES BAY, CALIFORNIA,
California Univ., Berkeley. Hydraulic Engineering Lab.
C. R. Minard, Jr.
Available from the National Technical Information Service as AD-733 280, $3.00 in paper copy, $1.45 in microfiche. Report no. HEL-2-35, August 1971. 223 p, 29 fig, 84 ref, 2 append. DACW72-71-C-0024.

Descriptors: Beaches, Coasts, *Shore protection, *Erosion, *Sedimentation, Geologic history, *Sediment transport, California.
Identifiers: *Coastal processes, *Near shore processes, Littoral zone, Sea level variations, Progradation, *Sand transport, Geomorphology, Heavy minerals, *Longshore transport.

Conditions were studied which in the past promoted or inhibited the movement of large quantities of sand down the coast of northern California from the Russian River to Double Point, and these conditions were compared with those at present. The influence of erosion and deposition on the sand budget was studied. Modern and ancient wave-cut platforms, sea cliffs, beaches, and coastal dunes were examined in the field and on air photos, and reconnaissance-type maps were drawn of these features. Heavy mineral analyses determined the source of deposits along the coast. Swells from the northwest move sand downcoast from northern California, but there is little net longshore transport west of the San Andreas Fault between the Russian River and Double Point. Sand carried by the river and coastal streams east of the fault is trapped upcoast at Tomales Bay. The headland at western Point Reyes blocks the sand flow. Beaches of the area contain heavy minerals from various sources. (Sinha-OEIS)
W74-00019

SAND MOVEMENT IN RELATION TO BEACH TOPOGRAPHY,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
D. S. McArthur.
Available from the National Technical Information Service as AD-693 123, $6.00 in paper copy, $1.45 in microfiche. Report No. TR-67, June 30, 1969. 26 p, 14 fig, 3 tab, 28 ref.

Descriptors: *Sediment transport, *Beaches, *Topography, *Sands, Waves (Water), Shoals, *Shallow water, Tracers, Sand bars, Currents (Water), Florida.
Identifiers: Hurricane Island (Florida), Alongshore transport, *Coastal processes, *Near shore processes.

Tracer experiments were conducted on the Gulf Coast beach of Hurricane Island, Florida, to obtain information on sediment transfer between foreshore, trough, and bar topography. Concurrent measurements of waves and currents were collected. Along-shore transport of tracer released in the three topographic zones was greater than normal-to-shore movement, even when the angle between wave crests and the shoreline was small. Seaward movement of tracer placed in the trough and bar zones took place during alongshore transport only when waves broke on the bar, and was most marked when wave steepness had a value near 0.04. During these conditions tracer released in the trough moved onto and along the bar crest. At other times landward displacement of bar and trough tracer accompanied alongshore transport. Tracer placed on the bar moved into the trough. Only when a subaqueous shoal replaced the trough immediately seaward of the beach step did appreciable amounts of tracer move seaward from the foreshore. Rhythmic topography appears, therefore, to provide an important mechanism for onshore-offshore movement of sediment within a beach system. Transport of tracer from the trough and bar onto the foreshore was negligible over all experiments. (Sinha-OEIS)
W74-00020

EQUILIBRIUM CHARACTERISTICS OF SAND BEACHES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
P. S. Eagleson, B. Glenne, and J. A. Dracup.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 89, No 1, pt 1, Proceedings Paper 3387, p 35-57, January 1963. 11 fig, 2 tab, 17 ref.

Descriptors: *Shallow water, *Sediment transport, Erosion, Deposition (Sediments), Beaches, Sands, Equilibrium.
Identifiers: Suspended sediments, Beach profiles.

The principal problem under study is the equilibrium configuration of sand beaches in the zone offshore of appreciable breaker influence. Use is made of previous theoretical and experimental studies of the mechanics (bed load) of the motion of discrete spherical sediment particles moving on a plane, impermeable, sloping beach due to the action of shallow-water waves. Equations are developed which express the profile of an equilibrium sand beach in terms of the incident deep-water wave characteristics and the fluid and sediment properties. The offshore boundary condition of this equation is shown to govern not only the seaward limit of profile modification by the given wave but also whethe, with respect to its initial configuration, the new equilibrium profile requires an aggradation or degradation in the offshore zone. Laboratory experiments using sand

beaches of essentially uniform particle size provide reasonable confirmation of the theoretical prediction of the seaward extreme of profile modification and of the equilibrium profile in this region. Breaker effects, including the movement of suspended sediments, unaccounted for in the theory, distort the actual profile shoreward of this area. The experiments, together with those of another investigator, verify in all cases the aggrading-versus-degrading offshore profile classification given by the theory, thereby providing the engineer with a rational classification criterion that appears to be an improvement over the conventional technique which is based solely on the deep-water wave steepness. (Sinha-OEIS)
W74-00027

REORIENTATION OF CONVEX SHORES,
Florida State Univ., Tallahassee.
W. F. Tanner.
American Journal of Science, Vol 260, No 1, p 37-43, January 1962. 2 fig, 15 ref.

Descriptors: *Shores, *Sedimentation, Equilibrium, *Littoral drift, *Beaches, *Coasts, Energy loss, Shoaling, Beach erosion.
Identifiers: Wave refraction, Scalloped shorelines, Carolina Bays, Sand prism, Curvature, Convex shores.

Convex shores are commonly marked by downdrift decreases in energy. These decreases are due to wave refraction. Shores of this type develop an equilibrium outline by a combination of updrift erosion and downdrift deposition. The resulting form is a concavity or embayment having a radius of curvature equal to about one-fourth of the effective fetch. Several such concavities, with their intervening spits and shoals, may give the shore a 'scalloped' look; bays and lagoons having shores shaped in this fashion have been described as 'segmented'. The oval marshes known as the 'Carolina Bays' formerly may have been lakes that were given their nearly circular outlines in the same way. Not all coastal concavities are due to this process, however, and not all equilibrium shores have the scalloped outline. (Sinha-OEIS)
W74-00028

DYNAMICS OF SWASH AND IMPLICATION TO BEACH RESPONSE,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
E. Waddell.
Available from the National Technical Information Service as AD-760 699, $3.00 in paper copy, $1.45 in microfiche. Technical Report No. 139, March 1973. 49 p, 47 ref. ONR NOOO14-69-A-0211-0003. Proj. NR 388 002.

Descriptors: *Beaches, *Erosion, *Deposition (Sediments), *Sediment transport, *Sand waves, *Groundwater, Beach erosion, *Shallow water, *Waves (Water), Florida.
Identifiers: Santa Rosa Island (Florida), *Coastal processes, *Near shore processes, Swash, Collision.

A field investigation on a natural sand beach of the swash process and the inter-action of swash with input waves, beach ground water, and beach sand levels was conducted on Santa Rosa Island, Florida. During uprush and the initial part of backwash, the leading edge of the uprush behaved in a manner similar to that of a unit mass released upward on a frictionless slope with an initial momentum and acted on only by the downslope component of gravity. The initial momentum at the base of the slope was higher than expected from characteristics of input waves. Inundation periods under the swash predicted by the nonlinear wave theory of Shen and Meyer (J. Fluid Mechanics 16:108-125 1962) agreed with the data within 30%. However, whereas the theory predicted only a single water depth maximum associated with the uprush, the data exhibited two water depth maxima within a single swash cycle: one associated with uprush and another with backwash. The second maximum, which occurred only on the lower beach, resulted from either (1) a retrogressive bore growing in height while moving seaward or (2) collision between backwash and the uprush from a succeeding swash. The phenomenon of collision was characteristic of real swashes and was a direct result of periodic input waves. The collision process was ignored in the mathematical theory of Shen and Meyer, which was based on consideration of a solitary input wave. Swash power spectra consistently displayed three prominent peaks. The beach ground water level exhibited fluctuations of both interswash and beat frequencies. Sand level data revealed the possible presence of low amplitude sand waves which persistently migrated downslope during both erosion and nonerosion. These sand waves exhibited an average celerity on the order of 3-10 cm/sec and a -2 power frequency dependence below the equilibrium subrange. (Sinha-OEIS)
W74-00032

CHARACTERISTICS OF WAVE RECORDS IN THE COASTAL ZONE,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02H.
W74-00033

CONGO SUBMARINE CANYON AND FAN VALLEY,
Scripps Institution of Oceanography, La Jolla, Calif. Geological Research Div.
F. P. Shepard, and K. O. Emery.
The American Association of Petroleum Geologists Bulletin, Vol 57, No 9, p 1679-1691, September 1973, 10 fig, 11 ref.

Descriptors: *Submarine canyons, *Africa, Erosion, Continental shelf, Turbidity currents, Sediment transport, Estuaries.
Identifiers: *Congo submarine canyon.

Seventeen transverse profiles of the inner 400 km of the Congo Canyons and the Congo Fan Valley were made during a 4-day study in June 1972. These profiles show that the canyon is V-shaped with side slopes 400-1, 400 m high between the coast and a point 240 km seaward, where the axial depth is about 2,700 m. Farther seaward, the continuation as a fan valley narrows and is bordered by levees a few tens of meters high. Distributaries continue for at least an additional 320 km to depths of 4,900 m. Seismic profiles show that the canyon has been cut through a belt of diapirs. The absence of a broad delta at the mouth of the Congo River, the presence of a possible temporary fill at the head, a steep axial slope near the head, a submerged fan bordering the seaward side of the diapir belt, and levees at depth support the concept of origin of the canyon-fan-valley system largely through erosion and deposition by turbidity currents. Tidal-current scour probably helps to limit the amount of fill in the canyon head. (Knapp-USGS)
W74-00093

GRAIN SIZE STUDIES ON TURBIDITE COMPONENTS FROM TYRRHENIAN DEEP SEA CORES,
Kiel Univ. (West Germany). Geologisch-Palaeontologisches Institut und Museum.
M. Sarnthein, and C. Bartolini.
Sedimentology, Vol 20, No 3, p 425-436, August 1973, 6 fig, 2 tab, 15 ref.

Descriptors: *Particle size, *Bottom sediments, *Turbidity currents, Sands, Sedimentation, Sedimentology, Stratigraphy, Sediment sorting.
Identifiers: *Turbidities, *Tyrrhenian Sea, Pumice.

Through an analysis of their coarse--grain composition, pumice-rice sandy layers from deep sea cores were identified as shelf-derived turbidities rather than deposits due to ash fall or drifting pumice. A comparison of median sizes of individual grain types and total samples yielded significant trends in vertical and horizontal sorting, which allowed samples from different cores to be grouped into proximal and distal parts of one turbidite type. Planktonic molluscs and foraminifera have diameters 1.1 to 2.75 times larger than those of pumice. Weathered shallow-water skeletal materials have diameters approximately equal to pumice, whereas those of augite and hornblende are 1.25 to 2.3 times smaller. This results in a different proportion of components in proximal and distal turbidite samples. (Knapp-USGS)
W74-00100

HOLOCENE METEORIC DOLOMITIZATION OF PLEISTOCENE LIMESTONES, NORTH JAMAICA,
Texas Univ., Austin. Dept. of Geological Sciences.
L. S. Land.
Sedimentology, Vol 20, No 3, p 411-424, August 1973. 3 fig, 7 tab, 20 ref.

Descriptors: *Diagenesis, *Limestones, *Dolomite, *Groundwater, Sea water, Carbonates, Ion exchange, Water table, Magnesium, Calcium.
Identifiers: *Jamaica.

Removal of the unstable carbonate phases aragonite and Mg-calcite, and precipitation of calcite and dolomite is currently taking place where phreatic waters invade 120,000-year-old Pleistocene biolithites (Falmouth Formation), North Jamaica. Pleistocene rocks presently in the vadose zone are relatively unaltered, and consist of mineralogically unstable scleractinian biolithites. At the water table, a narrow zone of solution (a water table cave) is commonly encountered. Below the water table the rocks are invariably more highly altered than those above. Mg-calcites are very rare, and considerable dissolution of aragonite has commonly occurred. Dolomite occurs as 8-25 micrometers, subhedral to euhedral crystals replacing micrite, or precipitated as void linings. The isotopic composition of the dolomite and its high strontium content suggest precipitation as meteoric groundwaters oversaturated in CO2 invade the mineralogically unstable biolithites and dissolve Mg-calcites and Sr-rich aragonites. Because some dolomitized rocks are enriched in magnesium relative to unaltered biolithites, addition of magnesium to the system has occurred; it is probably derived from sea water in the mixing zone. Phreatic meteoric diagenesis is a rapid process, and it is capable of dolomitization. (Knapp-USGS)
W74-00101

EFFECT OF COMPACTION ON CHEMISTRY OF SOLUTIONS EXPELLED FROM MONTOMORILLONITE CLAY SATURATED IN SEA WATER,
University of Southern California, Los Angeles. Dept. of Petroleum Engineering.
G. V. Chilingarian, C. T. Sawabini, and H. H. Rieke.
Sedimentology, Vol 20, No 3, p 391-398, August 1973. 4 fig, 1 tab, 18 ref.

Descriptors: *Connate water, *Sea water, *Clays, *Compaction, Bottom sediments, Water chemistry, Ion exchange, Montmorillonite, Clay minerals, Leaching, Diagenesis.

The total mineralization of solutions squeezed out of montmorillonite clay saturated in sea water was determined at different overburden pressures. The subsequent fractions of expelled solutions were also analyzed for C1, SO4, HCO3, F, Na, K, Mg, Ca, and B. The concentrations of squeezed-out

solutions during the initial stages of compaction (at pressures up to 35 kg/sq cm) are slightly higher than that of interstitial solution present initially. The concentration of squeezed-out solution goes through a maximum, or at least remains constant, before starting to decrease with increasing overburden pressure. (Knapp-USGS)
W74-00102

USE OF THE MODEL T COULTER COUNTER IN SIZE ANALYSIS OF FINE TO COURSE SAND,
University of East Anglia, Norwich (England). School of Environmental Sciences.
I. N. McCave, and J. Jarvis.
Sedimentology, Vol 20, No 2, p 305-315, May 1973. 6 fig, 2 tab, 8 ref.

Descriptors: Particle size, *Instrumentation, Sieve analysis, Electrical conductivity, Calibrations.
Identifiers: *Particle size analysis.

An electrical sensing-zone particle size analyzer was calibrated for use with sands. A saline/glycerol electrolyte is used with a concentration of 0.1-0.5 g/liter of suspended sand. Calibration error is 1.6%. Comparison of counter and sieving results shows close agreement. Advantages of the machine are rapidity--a prepared sample can be analyzed in 60 sec--and the small size of the sample required. (Knapp-USGS)
W74-00103

WHISTLING SAND BEACHES IN THE BRITISH ISLES,
London Univ. (England). School of Pharmacy.
K. Ridgway, and J. B. Scotton.
Sedimentology, Vol 20, No 2, p 263-279, May 1973. 9 fig, 19 ref.

Descriptors: *Beaches, *Sands, *Particle size, *Particle shape, *Sediment sorting, Beds (Stratigraphic), Continental shelf, Sediments, Sedimentology.
Identifiers: *Whistling sands, *United Kingdom.

Beaches which squeak or whistle when walked on have been known for many years. Sand from 33 beaches in the British Isles whistles. Size distributions of all these sands were obtained by sieving, and the particle shape distribution in the peak size fractions was measured by using a vibratory shape-sorting table. A physical mechanism is suggested for the production of the whistle, which depends upon a close size grading coupled with a spherical grain shape. The locations at which whistling sand occurs correlate quite well with the landward ends of bed-load partings in the continental shelf sand transportation pattern as determined from side-scan Asdic surveys. (Knapp-USGS)
W74-00104

SETTLING BEHAVIOUR RELATED TO SIEVE ANALYSIS OF SKELETAL SANDS,
Dundee Univ. (Scotland). Dept. of Geology.
C. J. R. Braithwaite.
Sedimentology, Vol 20, No 2, p 251-262, May 1973. 4 fig, 12 ref.

Descriptors: *Settling velocity, *Particle shape, *Particle size, *Sieve analysis, Sands, Limestones, Carbonate rocks, Carbonates, Sediments, Sedimentation, Sedimentology.
Identifiers: *Skeletal sands, Bioclastic sediments.

The settling velocities of 1000 grains selected from sieved samples of bioclastic sand were individually measured in a 250-cm column of seawater. Four fall regimes are represented: straight fall, spinning and spiral modes, and erratic tumbling. As size increases grains pass through this series at rates dependent upon shape and effective density. Computed best-fit curves for velocities at intermediate diameters and an equivalent sphere of intermediate diameter illustrate considerable divergencies in behavior between the grain types and shape classes examined. Current methods of analysis of carbonate sediments, by sieving, by grain-counting of components, and by sedimentation balance, provide different kinds of information which have no simple relationship to each other. (Knapp-USGS)
W74-00105

CARBONATE CEMENTATION OF SOME PLEISTOCENE TEMPERATE MARINE SEDIMENTS,
Southampton Univ. (England). Dept. of Geology.
I. M. West.
Sedimentology, Vol 20, No 2, p 229-249, May 1973. 6 fig, 1 tab, 35 ref.

Descriptors: *Dagenesis, *Limestones, *Calcite, Sands, Leaching, Ion exchange, Sandstones, Beaches, Carbonates, Carbonate rocks.

Carbonate cementation of some carbonate and quartz sands in three raised beaches of temperate origins was derived from the dissolution of skeletal debris. The sandstones now possess only low magnesium calcite, but the original sediments, like adjacent modern beach and blown sands, probably contained low magnesium calcite, aragonite, and some high magnesium calcite, all of skeletal origin. The dissolution occurred within minute tubules of sand. Concurrent deposition in adjacent volumes of sand of low magnesium calcite formed cements that are irregularly nodular or uneven on a small scale. Aragonite within the minute nodules was replaced paramorphically by low magnesium calcite. (Knapp-USGS)
W74-00106

SELECTIVE TRANSPORT OF HEAVY MINERALS BY SHOALING WAVES,
Florida State Univ., Tallahassee. Dept. of Geology.
J. P. May.
Sedimentology, Vol 20, No 2, p 203-211, May 1973. 3 fig, 1 tab, 12 ref.

Descriptors: *Sediment transport, *Beaches, *Sands, *Surf, Mineralogy, Sediment sorting, Waves (Water), Sedimentation, Sedimentology, Beds (Stratigraphic), Hydraulic models, Model studies.
Identifiers: *Heavy minerals.

A model to account for the occurrence of heavy mineral concentrations as discrete lamina on beaches is based on the shoreward variation in the distribution of bottom fluid velocities due to shoaling water waves. This variation causes some portions of the sediment population to be transported shoreward at a faster rate than other portions. On moderate energy shorelines composed of sand-sized sediment the selectively transported portion may include the relatively hard-to-move heavy mineral fraction. Wave tank experiments with artificially prepared sediment populations provide empirical support for the proposed model. Under some conditions of water depth and wavelength, the heavy mineral fraction of the sediment population moved shoreward at a faster rate than did the light mineral fraction. (Knapp-USGS)
W74-00107

MINERALOGY OF PARENT MATERIALS, TOPSOILS AND EROSION PRODUCTS OF TAITA EXPERIMENTAL STATION,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
For primary bibliographic entry see Field 02G.
W74-00182

PROTEIN ADSORPTION BY SUSPENDED SEDIMENTS: EFFECTS OF PH, TEMPERATURE, AND CONCENTRATION,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 05B.
W74-00293

IN SITU MEASUREMENT OF SEDIMENT SOUND SPEED DURING CORING,
Texas Univ., Austin. Applied Research Labs.
D. J. Shirley, A. L. Anderson, and L. D. Hampton.
Available from NTIS, Springfield, Va. 22151, AD-758659 Price $3.00 printed copy; $1.45 microfiche. ONR Contract N00014-70-A-0166-0005.

Descriptors: *Core drilling, *Bottom sediments, *Oceanography, *Acoustics, *Sounding, Velocity, Instrumentation, Analytical techniques, Sedimentology, Logging (Recording), Drilling, Electrical properties, Electrical equipment, Data collections, Geology, Gulf of Mexico, Coasts.

A system has been developed for attachment to sediment corers to obtain an in situ sound speed profile during a coring operation. The system uses two electroacoustic transducers mounted in the cutting head of the corer and associated electronic circuitry to measure the travel time of an acoustic pulse traversing the diameter of the sediment core. Laboratory and field tests which demonstrate the capabilities of the measurement technique are reported. Results show accurate in situ sound speed values as well as sound speed variations which have high correlation with sediment lithology. Sound speed profiles were obtained in the Gulf of Mexico using a piston corer and in coastal waters using a special shallow water coring rig. Limited examination of the feasibility of measuring acoustic attenuation and volume scattering is also reported. The conclusion is that these measurements should be incorporated in the sound speed measurement technique reported here. (Woodard-USGS)
W74-00294

SEA-SURFACE CIRCULATION, SEDIMENT TRANSPORT, AND MARINE MAMMAL DISTRIBUTION, ALASKA CONTINENTAL SHELF,
Alaska Univ., College. Inst. of Marine Science.
G. D. Sharma, F. F. Wright, and J. J. Burns.
Available from NTIS, Springfield, Va., 22151 as E73-10370 Price $3.00 printed copy; $1.45 microfiche. Contract Report for NASA Goddard Space Flight Center, February 20, 1973. 33 p, 13 fig, 3 ref, 2 append.

Descriptors: *Sediment transport, *Water circulation, *Remote sensing, *Aerial photography, *Satellites (Artificial), *Alaska, Oceans, On-site investigations, Correlation analysis, Currents (Water), Data collections, *Continental shelf.
Identifiers: *Cook Inlet area (Alaska), *Bering Sea, Chukchi Sea.

Water and sediment movements and factors controlling sea mammal distribution were observed from ERTS multi-spectral scanner imagery. Emphasis during the first half year was upon data from the Cook Inlet area of southern Alaska and from the Bering Sea and Chukchi Sea of the northwest. Relatively, both these areas are accessible for ground truth observations, and the weather permitted the collection of useful ERTS imagery. The Bristol Bay area has also provided satisfactory imagery and it is anticipated that information from the extreme eastern end of this area will be available in useful quantities. The major effort was to obtain synchronous ground truth and satellite imagery. This is pertinent to the total understanding of the ERTS-1 imagery. Undoubtedly the sediments in the water column as observed from the ERTS imagery reflect the sources and movement of sediments and thereby elucidate the coastal sea surface circulation pattern. Detailed interpretation of sediment distribu-

tion and water circulation on the entire shelf, however, requires a more cautious approach. The turbid water as observed in the ERTS-1 imagery could be a result of biological material as well as sedimentary material. (Woodard-USGS)
W74-00298

PATTERNS OF SEDIMENT TRANSPORT AT NEARSHORE ZONES INFLUENCED BY WAVE AND TIDAL CURRENTS: A STUDY UTILIZING FLUORESCENT TRACERS,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 02L.
W74-00301

CONTINUITY OF TURBIDITY CURRENT FLOW AND SYSTEMATIC VARIATIONS IN DEEP-SEA CHANNEL MORPHOLOGY,
Oregon State Univ., Corvallis. School of Oceanography.
P. D. Komar.
Geological Society of America Bulletin, Vol 84, No 10, p 3329-3337, October 1973. 9 fig, 17 ref. NSF Grant GA-32122.

Descriptors: *Submarine canyons, *Turbidity currents, *Channel morphology, Continental shelf, Erosion, Geomorphology, Sedimentation, Sediment transport, Pacific Ocean.
Identifiers: *Cascadia Channel (Pacific Ocean).

When a turbidity current flow decreases in velocity due to a decrease in bottom slope, the thickness of the flow must correspondingly increase to maintain continuity of discharge. This increase is a possible explanation for observed systematic increases in the relief of submarine channels along their lengths. A simplified computer model of turbidity current flow along a channel indicates that without any dilution of the flow by water entrainment, a reasonable decrease in channel-axis slope could more than double the thickness of the flow. With dilution, the thickness could easily increase by a factor of four or more. The approach was applied to Cascadia Channel, located off the coast of the northwest United States, to test whether reasonable amounts of flow dilution could account for the observed increase in channel relief. Continuity of flow could explain much of the increase, but subsequent channel erosion has to be called upon to account for the entire increase in channel cross-sectional area. (Knapp-USGS)
W74-00348

CALCIUM CARBONATE CEMENTATION OF ALLUVIAL FANS IN SOUTHERN NEVADA,
Cincinnati Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 02K.
W74-00349

HYDROLOGY AND SEDIMENT TRANSPORT, MOANALUA VALLEY, OAHU, HAWAII,
Geological Survey, Honolulu, Hawaii. Water Resources Div.
For primary bibliographic entry see Field 02E.
W74-00354

SOME STUDIES ON WAVE REFRACTION IN RELATION TO BEACH EROSION ALONG THE KERALA COAST,
Indian Ocean Physical Oceanographic Centre of the Indian Ocean Expedition, Ernakulam.
P. K. Das, V. Hariharan, and V. V. R. Varadachari.
Proceedings of the Indian Academy of Sciences, Vol 64, No 3, p 192-202, September 1966. 6 fig, 3 tab, 6 ref.

Descriptors: *Waves (Water), *Refraction, *Beach erosion, Sedimentation, Deposition (Sediments), Ocean waves, Coasts, *Indian Ocean.
Identifiers: *India (Kerala coast), *Wave refraction, *Near shore processes, Short period waves, Longshore currents.

Using the British Admirality bathymetric charts off the West Coast of India and employing the graphical method of constructing wave refraction diagrams, an attempt is made to study the behavior of the short-period waves (4, 5, and 6 seconds) which are found to affect the coast generally in the neighborhood of Cochin Port entrance. Nineteen stations, at intervals of roughly one mile, are chosen around the three-fathom line in this area. Considering a probable field of approach of deep-water waves, limited to a cone of 90 degrees, five directions of approach are chosen at intervals of 22 1/2 degrees in the range of 202 1/2 degrees to 292 1/2 degrees. Refraction diagrams are prepared for these directions and periods, and from these, the refraction functions and directional parameters are evaluated for each station. The possible directions of flow of long-shore current and the areas vulnerable to erosion and sedimentation are investigated. (Sinha-OEIS)
W74-00506

MECHANISM OF SAND MOVEMENT ON COASTAL DUNES,
California Univ., Berkeley. Dept. of Civil Engineering.
A-L. A. Kadib.
Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 92, No WW2, Proceedings Paper 4817, p. 27-44, May 1966. 1 tab, 13 ref.

Descriptors: *Sediment transport, *Coasts, *Littoral drift, *Wind erosion, Saltation, Sediment load, *Dune sands, *Beaches.
Identifiers: *Near shore processes, Water transport, Wind transport, Wind action, Sand dunes.

The investigation, concerned with the study of the mechanism of sand movement by wind action, developed a method for calculating the rate of sand transport. This method is based on the Einstein theory for sediment transport in rivers and most available field and laboratory measurements on sand movement by wind. The main findings can be summarized as follows: The turbulence or velocity pulsations are largely responsible for sand movement by wind and their effect should be introduced. The description of the transport rate based on the effect of saltation only is misleading and the variation in the flow conditions at the bed should be included. Basically, the main principles governing the rate of sediment transport by water and air are the same. The only difference appears to be the effect of saltation in distrubing the bed surface in the case of air. The method is applicable for calculating the rate of sand transport under a wide range of wind velocities and for sand sizes ranging from 0.145 mm to 1.00 mm. (Sinha-OEIS)
W74-00509

NATURAL INDICATORS OF ESTUARINE SEDIMENT MOVEMENT,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W74-00512

STUDIES ON THE CURRENTS IN THE LITTORAL ZONE OF THE WALTAIR BEACH,
Andhra Univ., Waltair (India). Dept. of Meteorology and Oceanography.
R. Ramanadham, R. Varadarajulu, and B. R. Reddi.
Indian Journal of Pure and Applied Physics, Vol 3, No 7, p 269-271, July 1965. 1 fig, 6 ref.

Descriptors: *Deposition (Sediments), Sands, Harbors, Littoral, Shores, Circulation, Currents, *Sediment transport, *Coasts, *Shallow water.
Identifiers: *India (Waltair Beach), Breaker zone, wave rays, Littoral currents, *Littoral processes.

With a view to understanding the various processes responsible for the deposition of the sand in the harbor entrance channel, a study of the currents near the shore of the Waltair beach has been made using a light spherical float. The general circulation beyond the breaker zone and the littoral currents have been found to be in opposite directions. The magnitude of the currents increases towards the shore and the currents are in the same direction as that of the wave-rays. The direction of the littoral currents is towards the harbor entrance channel during the month of February. (Sinha-OEIS)
W74-00519

COASTAL PROCESSES AROUND THE OTAGO PENINSULA,
Otago Univ., Dunedin (New Zealand). Dept. of Geology.
W. A. Hodgson.
New Zealand Journal of Geology and Geophysics, Vol 9, No 1/2, p 76-90, July 1966. 7 fig, 15 ref.

Descriptors: *Coasts, *Beaches, *Waves (Water), *Refraction (Water waves), Shores, *Shallow water, Sediments, *Sediment transport, Drowned (Submerged), Littoral drift, Seashores, *Sand spits.
Identifiers: *New Zealand (Otago Peninsula), Swell, Longshore drift, Breaker zone.

Observations of the wave conditions around the Otago Peninsula were made during the period December 1963 to December 1964. From these observations the influence of sea and swell waves in developing the beaches and spits of this part of the Otago coastline has been assessed. The beaches, including the 'southward' - pointing spits of the peninsula, have developed largely in response to a dominant southerly swell of 10-15 sec. period, in spite of intense refraction. North of the peninsula, in an area sheltered from the swell, the dominant waves are produced by the north-easterly sea, which promotes some beach drift from north to south. The energy of dominant waves and the evolution of shoreline curves on a coast of submergence are discussed. (Sinha-OEIS)
W74-00521

BEACH NOURISHMENT FROM OFFSHORE SOURCES,
Gee and Jenson Construction Engineers, Inc., West Palm Beach, Fla.
H. C. Gee.
Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 91, No WW3, Proceedings Paper 4428, p 1-5, August 1965. 2 fig.

Descriptors: Beaches, *Beach erosion, *Coastal engineering, Coastal structures, Shore protection, Sea walls, Groins (Structures), *Engineering structures, Coasts, *Shallow water, *Florida.
Identifiers: Beach nourishment, *Jupiter Island (Fla).

Jupiter Island, Florida, suffered severe damage to its ocean front in 1962. Heavy swells in March and Northeast storms in November and December removed most of the material from the ocean beach and exposed bulkhead walls to severe wave attack. Emergency dredging was used to place 60,000 yd of material on the beach, structures were reinforced by use of granite boulders and construction of groins, but the problem of continuing beach nourishment was solved in a unique manner. A drag-scraper was used to excavate material from the offshore bottoms, a distance of 800 ft seaward of ordinary high water. This beach nourishment program from offshore sources has been in progress for two summers; results to date (1965) are encouraging. (Sinha-OEIS)
W74-00522

SALINITY OF INTERSTITIAL WATER IN A SANDY BEACH,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
For primary bibliographic entry see Field 02L.
W74-00523

EFFECTS OF THE ALASKA EARTHQUAKE AND TSUNAMI ON RECENT DELTAIC SEDIMENTS,
Scripps Institution of Oceanography, La Jolla, Calif.
E. Reimnitz, and N. F. Marshall.
Journal of Geophysical Research, Vol 70, No 10, p 2363-2376, May 15, 1965. 12 fig, 9 ref. Nonr 2216 (23).

Descriptors: *Coasts, *Tsunamis, *Alaska, Sediments, *Deltas, Erosion, *Sedimentation, Seiches, *Earthquakes, Ecology.
Identifiers: Tidal flats, Salt marshes, Barrier islands.

The Alaska Good Friday earthquake (its epicenter about 80 mi from the Copper River delta) and the events associated with the quake left indelible marks on the recent sediments of the delta. A relatively dense pattern of earthquake shock structures is found in the upper part of the section. These include sand dikes, sand pipes, slumps, faults, and joints. The structures increase in abundance toward the central part of the delta, where sediments are thickest, and become rare along its fringes, where sediments are thinnest. The 6-ft uplift of the region was responsible for some erosion and other immediate changes. But the establishment of a new equilibrium, biologically as well as geologically, for barrier islands, tidal flats, and marshes, will advance only gradually over the next few years. Seiches, brought about by the earthquake, with current velocities of up to 20 or 30 knots, regionally planed off the upper 2 or 3 ft of the tidal flats. These areas often are marked by accumulations of clam shells. The eroded materials were dumped into deep channels and troughs. (Sinha-OEIS)
W74-00524

TIDAL VARIATION OF THE SIZE DISTRIBUTION OF SUSPENDED SEDIMENT AT A STATION IN THE CHESAPEAKE BAY TURBIDITY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 02L.
W74-00525

SOME ASPECTS OF WAVE ACTION ON A GENTLY SLOPING SANDY BEACH,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 02E.
W74-00527

AN EXPERIMENTAL STUDY OF HEAVY--MINERAL SECREGATION UNDER ALLUVIAL-FLOW CONDITIONS,
Geological Survey, Washington, D.C.
L. L. Brady, and H. E. Jobson.
Available from Sup Doc, GPO, Washington, D.C. 20402 - Price $0.85. Professional Paper 562-K, 1973. 38 p, 24 fig, 7 tab, 38 ref, append.

Descriptors: *Sediment transport, *Alluvial channels, *Sedimentation, *Sediment distribution, *Mineralogy, Model studies, *Rio Grande River, Sands, Sedimentology, Particle size, Suspended solids, Bottom sediments, Sampling, Cores, *New Mexico.
Identifiers: *Heavy mineral segregation (Sedimentation), *Ilmenite, *Magnetite, Opaque minerals.

Segregation of opaque minerals (mainly ilmenite and magnetite) from the light minerals in a natural sand was observed in a large (61 x 2.44 x 1.22 meters) recirculating water-sediment flume. Bed material (medium size 0.286 millimeter) used in the study was taken from the Rio Grande near Bernardo, N. Mex. Opaque heavy minerals (medium size 0.144 millimeter) amounted to 0.38% of the bed-material volume. Significant hydraulic variables and the sorting and bedding patterns of the bed material were observed for four different bed configuations: a flat bed (upper flow regime), a transition bed, and two different dune beds (lower flow regime). Accumulations of opaque heavy minerals were formed as three basic types: (1) thin accumulations of small extent that were associated with the upstream or stoss slopes of dunes; (2) accumulation associated with the topset deposits of large dunes and with dunes formed in the transition flow; and (3) accumulations associated with the flat-bed condition. The most important factors influencing the type and amount of accumulation of opaque heavy minerals are bed configuration and grain density. The most widespread deposits were the segregations of heavy minerals associated with the base of the flat beds. (Woodard-USGS)
W74-00533

2K. Chemical Processes

INTERACTION OF BULK PRECIPITATION, STREAM WATER, AND SEWAGE IN A SMALL WATERSHED NEAR OXFORD, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 02A.
W74-00005

GAS-CHROMATOGRAPHIC DETERMINATION OF SELENIUM,
Kentucky Dept. of Health, Frankfort. Instrumentation Lab.
J. W. Young, and G. D. Christian.
Analytica Chimica Acta, Vol 65, No 1, p 127-138, June 1973. 3 fig, 3 tab, 42 ref.

Descriptors: *Gas chromatography, *Urine, Water analysis, Separation techniques, *Chemical analysis.
Identifiers: *Selenium, *Blood, Detection limits, Chemical interference, Chemical recovery, Sensitivity, Reproducibility, Biological samples, Sample preparation, Electron capture gas chromatography.

Samples to be analyzed for selenium are prepared by reacting selenium (IV) with 2,3-diaminonaphthalene at pH 2 to form the well established complex, which is extracted into hexane. An aliquot of the hexane layer is analyzed gas chromatographically with an electron-capture detector. As little as 5 times 10 to the minus 10 g of selenium could be detected; 0.01 microgram of selenium could be determined in a sample by extracting into 0.1 ml of hexane and injecting a 5-microliter aliquot of the extract. The method was applied to the determination of physiological amounts of selenium in human blood and urine. Averages of 0.38 p.p.m. and 0.007 p.p.m. selenium were found in blood and urine, respectively. River water samples were also analyzed. Complete analysis time for a sample is less than 3 h, including time for digestion of the sample and 2 h for formation of the complex. (Little-Battelle)
W74-00041

THE RATE OF LOSS OF MERCURY FROM AQUEOUS SOLUTION WHEN STORED IN VARIOUS CONTAINERS,
Idaho Univ., Moscow. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-00043

DETERMINATION OF SOME RARE-EARTH ELEMENTS BY PLASMA-JET EMISSION SPECTROMETRY,
Kitami Inst. of Tech. (Japan).
I. Atsuya, and H. Goto.
Analytica Chimica Acta, Vol 65, No 2, p 303-309, July 1973. 6 fig, 3 tab, 14 ref.

Descriptors: *Pollutant identification, *Aqueous solutions, *Chemical analysis, Methodology, *Spectrophotometry.
Identifiers: Magnetic field, *Rare earth elements, *Plasma-jet emission spectrometry, Spectral analysis, Detection limits, Lanthanum, Yttrium, Accuracy, Gadolinium, Monazite, Precision, Scandium, Praseodymium, Neodymium, Samarium, Cerium.

The effects of a magnetic field on spectral intensities in plasma-jet spectrometry were examined, and detection limits for rare-earth elements were calculated. Plasma-jet emission spectrometry was applied to the determination of lanthanum, yttrium and gadolinium in a monazite sample from which thorium had been separated. A standard addition method was used in order to improve accuracy, and the internal standard and background compensation method was applied to measurements of spectral line intensities to achieve good precision. The coefficient of variation was 1.51 percent for 50 micrograms La/ml. (Holoman-Battelle)
W74-00044

SAMPLING THE EDIBLE MUSCLE OF THE SWORDFISH (XIPHIAS GLADIUS) FOR TOTAL MERCURY ANALYSIS,
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
For primary bibliographic entry see Field 05A.
W74-00052

SEPARATION OF WATER FROM BIOLOGICAL AND ENVIRONMENTAL SAMPLES FOR TRITIUM ANALYSIS,
National Environmental Research Center, Las Vegas, Nev.
For primary bibliographic entry see Field 05A.
W74-00053

A MODEL FOR CHEMICAL EXCHANGE IN THE BASALT-SEAWATER SYSTEM OF OCEANIC LAYER II,
Oregon State Univ., Corvallis. School of Oceanography.
R. A. Hart.
Canadian Journal of Earth Sciences, Vol 10, No 6, p 799-816, June 1973. 7 fig, 6 tab, 51 ref. NSF Grants GA-135 16, GA-27548, GA-35406.

Descriptors: *Weathering, *Water chemistry, *Sea water, *Basalts, Leaching, Potassium, Magnesium, Sodium, Silica, Calcium, Iron, Manganese, Chemical reactions, Geochemistry, Oceanography.

The upper 2-3 km of oceanic layer II is a zone of chemical reaction between seawater and the oceanic crust as it moves away from the midocean ridges. The principal alteration products resulting from the action of seawater on primary basalts are K-rich smectite formed during weathering of basalt, chlorite formed during retrograde metamorphism, and albite-actinolite formed during primary greenschist metamorphisma at the ridge crest. These three processes in combination extract most of the stream input of K, Mg, and Na, and add Si02, Ca, Fe, and Mn to the ocean systems in amounts comparable to stream input. The steady-state reactions of basalt with interstitial seawater to produce alteration minerals exercise a strong influence in the chemistry of seawater and release energy in amounts sufficient to form a portion of normal heat flow measured on the ocean floor. (Knapp-USGS)
W74-00097

HOLOCENE METEORIC DOLOMITIZATION OF PLEISTOCENE LIMESTONES, NORTH JAMAICA,
Texas Univ., Austin. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02J.
W74-00101

EFFECT OF COMPACTION ON CHEMISTRY OF SOLUTIONS EXPELLED FROM MONTOMORILLONITE CLAY SATURATED IN SEA WATER,
University of Southern California, Los Angeles. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 02J.
W74-00102

CARBONATE CEMENTATION OF SOME PLEISTOCENE TEMPERATE MARINE SEDIMENTS,
Southampton Univ. (England). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-00106

THE DUSHANBE ARTESIAN BASIN AND ITS MINERAL AND THERMAL WATERS (DUSHANBINSKIY ARTEZIANSKIY BASSEYN I YEGO MINERAL'NYYE I TERMAL'NYYE VODY),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Geologii.
For primary bibliographic entry see Field 04B.
W74-00117

WATER CHEMISTRY OF ELLICOTT CREEK, WESTERN NEW YORK,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05A.
W74-00166

NITRATE CONTENT OF WELL WATER IN WEST-CENTRAL WISCONSIN,
Wisconsin Univ., River Falls.
For primary bibliographic entry see Field 05B.
W74-00246

APPLICATION OF HIGH-SPEED LIQUID CHROMATOGRAPHY TO ORGANIC MICROANALYSIS. I. CONSTRUCTION OF A SIMPLE AND INEXPENSIVE APPARATUS,
City Univ. of New York.
R. Stillman, and T. S. Ma.
Mikrochimica Acta, No 4, p 491-506, 1973. 6 fig, 1 tab, 40 ref.

Descriptors: *Laboratory equipment, Construction, *Chemical analysis, *Laboratory tests, *Organic compounds, Operations, Evaluation, Costs, Instrumentation, Testing, Fabrication, Testing procedures, Separation techniques.
Identifiers: *Liquid chromatography, *Trace levels, Detection limits, Reproducibility, Droppingmercury electrode, Sensitivity, Precision, Parathion, Methyl parathion.

Construction and operation details are given for a simple, inexpensive system used for liquid chromatography which is capable of separations whose speed and detection limits are comparable or superior to many commercial units. The system consists of a microdetector based on the principle of polarography with a dropping mercury electrode (DME), an electronic measuring circuit, a high pressure solvent pumping device, a sample injector, and highly efficient chromatographic columns. This system has been tested using parathion and methyl parathion. The minimum detectable quantity was about 0.01 microgram with a coefficient of variation of plus or minus 1.8 percent. In addition to compounds which are reducible at the DME at electrode potentials between -0.3 and -2.0 volts (the useful range for aqueous or aqueous-alcohol solvent systems), other classes of compounds were detected, e.g., those exhibiting catalytic waves. All components of the system are readily available or easily fabricated, and the cost, exclusive of strip-chart recorder, is approximately $200. (Holoman-Battelle)
W74-00249

PETROCHEMICAL ANALYTICAL PROBLEMS. II. GAS-LIQUID CHROMATOGRAPHIC-MASS SPECTROMETRIC INVESTIGATION OF INDUSTRIAL DODECYLBENZENES,
Magyar Tudomanyos Akademia, Veszprem. Research Group for Petrochemistry.
For primary bibliographic entry see Field 05A.
W74-00250

VOLTAMMETRIC DETERMINATION OF NITRATE AND NITRITE IONS USING A ROTATING CADMIUM DISK ELECTRODE,
Iowa State Univ., Ames. Dept. of Chemistry.
R. J. Davenport, and D. C. Johnson.
Analytical Chemistry, Vol 45, No 11, p 1979-1980, September 1973. 3 fig, 24 ref.

Descriptors: *Nitrates, *Nitrites, *Pollution identification, *Methodology, Chemical analysis, Electrochemistry, Aqueous solutions, Ions.
Identifiers: *Rotating cadmium disk electrodes, *Voltammetry, Rotating disc electrodes, Cadmium electrodes.

Cathodic current-potential curves are described which have been obtained with a rotating cadmium disk electrode (RCDE) in weakly acidic solutions of nitrate and nitrate ions. At low rotational velocities and bulk concentration, the cathodic currents are limited by convective-diffusional mass transport. Based on the reported results it is thought that rapid procedures for the accurate determination of nitrate and nitrite ions in aqueous solutions can be developed based on voltammetry with cadmium electrodes. Many species are expected to interfere in the determination including oxygen and transition metal cations which can be reduced at the electrode and separations are required. (Holoman-Battelle)
W74-00251

SILICA GEL AS AN INSOLUBLE CARRIER FOR THE PREPARATION OF SELECTIVE CHROMATOGRAPHIC ADSORBENTS - THE PREPARATION OF 8-HYDROXYQUINOLINE SUBSTITUTED SILICA GEL FOR THE CHELATION CHROMATOGRAPHY OF SOME TRACE METALS,
Rothamsted Experimental Station, Harpenden (England). Biochemistry Dept.
J. M. Hill.
Journal of Chromatography, Vol 76, No 2, p 455-458, February 28, 1973. 14 ref.

Descriptors: *Trace elements, Copper, Adsorption, Manganese, Zinc, Heavy metals.
Identifiers: *Chelation chromatography, *8-Hydroxyquinoline, *Aminopropyl silica gel, Adsorbents, 3-Aminopropyl triethoxy silane, Diazotization, Sample preparation.

Aminopropyl silica gel made by treating chromatographic grades of silica gel with 3-aminopropyl triethoxy silane, is reacted with p-nitrobenzoyl chloride and the -NO2 group reduced to -NH2 with sodium dithionite. Diazotization and reaction with 8-hydroxyquinoline produces a dark red silica gel derivative which can be used for the removal, concentration and separation of trace amounts of copper and other biologically important trace-metal cations from solutions of high ionic strength. The preparation of other selective adsorbents with different reactive groups is discussed. (Holoman-Battelle)
W74-00252

GAS-LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY OF ORGANOMERCURY COMPOUNDS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05A.
W74-00253

THIN-LAYER CHROMATOGRAPHY AND ENZYME INHIBITION TECHNIQUES. INTRODUCTION,
Department of National Health and Welfare, Ottawa (Ontario). Health Protection Branch.
For primary bibliographic entry see Field 05A.
W74-00254

ULTRATRACE ANALYSIS (BELOW P.P.B.) BY COUPLING CENTRIPETAL THIN-LAYER CHROMATOGRAPHY AND GAS CHROMATOGRAPHY,
Ceskoslovenska Akademie Ved, Brno. Ustav Instrumentalni Analyticke Chemie.
For primary bibliographic entry see Field 05A.
W74-00255

THE USE OF PRESSURE-ASSISTED LIQUID CHROMATOGRAPHY IN THE SEPARATION OF POLYNUCLEAR HYDROCARBONS,
Metropolitan Police Forensic Lab., London (England).
For primary bibliographic entry see Field 05A.
W74-00256

CADMIUM CONCENTRATIONS IN SOME FISH SPECIES FROM A COASTAL AREA IN SOUTHERN NORWAY,
Norges Veterinarhoegskole, Oslo. Dept. of Biochemistry.
For primary bibliographic entry see Field 05A.
W74-00257

COMPOSITIONAL STUDIES OF A HIGH-BOILING 370-535 C DISTILLATE FROM PRUDHOE BAY, ALASKA, CRUDE OIL,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 05A.
W74-00258

ADSORPTION OF TRACES OF INSECTICIDES FROM WATER ON POLYETHYLENE, (ADSORPTION VON SPUREN VON INSECTICIDEN AUS WASSER AN POLYATHYLEN),
Mainz Univ. (West Germany).
For primary bibliographic entry see Field 05A.
W74-00259

A SYSTEM FOR POLYACRYLAMIDE GEL ELECTROPHORESIS OF HUMIC ACIDS, (EIN SYSTEM ZUR POLYACRYLAMIDGELELEKTROPHORESE VON HUMINSAUREN),
Medizinische Akademie Erfurt (East Germany). Institut fuer Medizinische Mikrobiologie.
For primary bibliographic entry see Field 05A.
W74-00260

A STUDY OF THE VARIATION WITH PH OF THE SOLUBILITY AND STABILITY OF SOME METAL IONS AT LOW CONCENTRATIONS IN AQUEOUS SOLUTION. PART II,
Imperial Chemical Industries Ltd., Northwich (England). Winnington Lab.
For primary bibliographic entry see Field 05A.
W74-00261

ON THE QUANTITATIVE DETERMINATION OF FREE CARBON DIOXIDE IN NATURAL WATERS, (ZUR QUANTITATIVEN BESTIM-

MUNG DER FREIEN KOHLENSAURE IN NATURLICHEN WASSERN),
J. Kegel.
Zeitschrift fur Analytische Chemie, Vol 265, No 4, p 253-256, July 12, 1973. 4 ref.

Descriptors: *Carbon dioxide, *Theoretical analysis, Methodology, Gases, Chemical analysis, *Water analysis, Estimating, Pollutant identification.
Identifiers: *Quantitative analysis, *Natural waters, Errors.

The theoretical examination of errors, undertaken by Hasselbarth (1965) on a new method to determine free carbon dioxide in water is investigated and it is found that he had employed wrong bases and arrived at misleading results. In his practical work, he had not considered all the possibilities of the method, which explains a number of differences. Therefore, the practical application of the method is described in detail. (Holoman-Battelle)
W74-00263

THE DETERMINATION OF CHROMIUM IN HUMAN URINE BY GAS CHROMATOGRAPHY USING A FLAME PHOTOMETRIC DETECTOR WITH A 425, 4 NM FILTER,
Environmental Protection Agency, Perrine, Fla. Perrine Primate Lab.
For primary bibliographic entry see Field 05A.
W74-00270

COUPLING OF HIGH SPEED PLASMA CHROMATOGRAPHY WITH GAS CHROMATOGRAPHY,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
S. P. Cram, and S. N. Chesler.

Descriptors: Methodology, *Chemical analysis, Organic compounds, Effluents, *Gas chromatography, Flow rates, Gases, *Chromatography.
Identifiers: *GC-Plasma chromatography, Sensitivity, GC-Mass spectrometry, Signal-noise ratios, Flame ionization detectors.

A gas chromatography has been applied to a new rapid scan (20 msec) plasma chromatography without the use of a molecular separator. The sensitivity, noise, and signal-to-noise ratio for Freons analyzed on the plasma chromatography were found to be relatively insensitive to changes in the plasma chromatography carrier and drift gas flow rates, and a unique mass calibration curve for the E-series Freons is reported. The sensitivity of the plasma chromatograph and GC FIDs are compared for Freons and the utility of the plasma chromatography in identifying GC effluents and peak fractionation is reported. A comparison is made between gas chromatography/plasma chromatography and GC/MS. (Holoman-Battelle)
W74-00271

AN ON-LINE SPECTROPHOTOMETER FOR COLLECTION OF MANIPULATION OF ABSORBANCE SPECTRA,
Georgia Univ., Athens. Dept. of Biochemistry.
For primary bibliographic entry see Field 07C.
W74-00272

MICRODETECTION OF NITRATE WITH MALACHITE GREEN OR CONGO RED,
V.S. Sanatan Dharma Coll., Kanpur (India). Dept. of Chemistry.
G. S. Johar, and G. D. Tiwari.
Zeitschrift fur Analytische Chemie, Vol 265, No 1, p 32, May 25, 1973.

Descriptors: *Nitrites, *Pollutant identification, Chemical analysis, Aqueous solutions, Iodides, Color reactions.
Identifiers: *Trace levels, *Congo Red, *Malachite Green, Detection limits, Sensitivity, Chemical interferences, Azides, Chromogenic reagents.

Two procedures are outlined for a rapid and sensitive detection of minute quantities of nitrate. One procedure employs Malachite Green as the color-developing reagent with a detection limit of 75 micrograms nitrite per 0.25 ml. The other procedure uses Congo Red; the detection limit is 550 micrograms per 0.5 ml. Common anions and cations do not interfere in the tests. The only interference is caused by iodide and by azide in large amounts. (Holoman-Battelle)
W74-00273

A FLUOROMETRIC METHOD FOR THE DETERMINATION OF NITRILOTRIACETIC ACID,
Missouri Univ., Kansas City. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-00274

DIRECT DETERMINATION OF BISMUTH AND ANTIMONY IN SEA WATER BY ANODIC STRIPPING VOLTAMMETRY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
T. R. Gilbert, and D. N. Hume.
Analytica Chimica Acta, Vol 65, No 2, p 451-459, July 1973. 4 fig, 2 tab, 20 ref.

Descriptors: *Sea water, *Chemical analysis, Methodology, *Pollutant identification, Water analysis, Electrochemistry, Water sampling, Water storage, Copper, Plastics, Metals.
Identifiers: *Bismuth, *Antimony, *Anodic stripping voltammetry, Graphite electrodes, Sample preparation, Detection limits, Chemical loss, Silver, Chemical interference.

A method based on anodic stripping voltammetry at the mercury-coated graphite electrode has been developed for the direct determination of bismuth and antimony at their natural levels in seawater. Bismuth plated at -0.4 V from seawater made 1 M in hydrochloric acid gives a stripping peak proportional to concentration at -0.2 V without interference from antimony or other metals normally present. Antimony may be plated from seawater made 4 M in hydrochloric acid and gives a stripping peak at -0.2 V proportional to the sum of bismuth and antimony. By use of the standard addition technique, satisfactory results were obtained for seawater samples with concentration ranges of 0.02-0.09 microgram/kg for bismuth and 0.2-0.5 microgram/kg for antimony. (Holoman-Battelle)
W74-00275

IMPROVED APPARATUS FOR DETERMINATION OF MERCURY BY FLAMELESS ATOMIC ABSORPTION,
New England Aquarium, Boston, Mass.
For primary bibliographic entry see Field 05A.
W74-00276

DISPERSION AND TRANSPORT OF RHODAMINE B DYE AND METHOXYCHLOR IN RUNNING WATER: A PRELIMINARY STUDY,
Queen's Univ., Kingston (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-00279

MESITYL OXIDE AS AN EXTRACTING AGENCY FOR BERYLLIUM,
Indian Inst. of Tech., Bombay. Dept. of Chemistry.
P. V. Dhond, and S. M. Khopkar.
Analytical Chemistry, Vol 45, No 11, p 1937-1938, September 1973. 2 tab, 9 ref.

Descriptors: *Separation techniques, *Beryllium, *Aqueous solutions, Metals, Chemical analysis.
Identifiers: Chemical interference, *Mesityl oxide, Sample preparation, Chemical recovery.

Beryllium nitrate was dissolved in distilled water to investigate the usefulness of mesityl oxide (4-methyl-3-pentene-one) as an extracting agent. The procedure involved adding hydrochloric acid and potassium thiocyanate to an aliquot of solution containing 20 micrograms Be, transferring the aqueous phase to a separatory funnel, and extracting with mesityl oxide for 3 minutes. After the two layers separate, Be is stripped off by shaking once with distilled water. Sodium acetate is added to the aqueous phase, the pH adjusted, aluminon is added, the solution allowed to stand for 20 minutes, and the absorbance measured at 530 nm. The method is simple, sensitive, and selective, and applicable at microgram concentrations of Be. Common inorganic and organic ions were well tolerated. Recovery of Be was 99.5 percent plus or minus 0.5 percent. (Little-Battelle)
W74-00280

IMPROVEMENTS IN THE MANGANESE DIOXIDE COLLECTION OF TRACE LEAD AND BISMUTH IN NICKEL,
International Nickel Co. of Canada Ltd., Sheridan Park (Ontario). J. Roy Gordon Research Lab.
St. J. H. Blakeley, A. Manson, and V. J. Zatka.
Analytical Chemistry, Vol 45, No 11, p 1941-1943, September 1973. 5 tab, 3 ref.

Descriptors: *Separation techniques, *Lead, *Nickel, Hydrogen ion concentration, Heavy metals, Aqueous solutions, Chemical precipitation.
Identifiers: Sample preparation, Coprecipitation, *Bismuth, Atomic absorption spectrophotometry, Chemical recovery, Detection limits, Accuracy, Reproducibility, *Trace levels.

Investigation of the method of using manganese dioxide for coprecipitating microgram quantities of lead and bismuth in nickel prior to atomic absorption analysis showed that lead recoveries were low and not reproducible. Using aqueous solutions of the metals dissolved in acid, it was found that formation of manganese dioxide in a boiling solution, as used in the method, results in a precipitate which has its collecting power for lead substantially reduced by the high ionic strength of the solution due to the large excess of nickel ions. By raising the pH to 4.5 and by performing the permanganate oxidation in the cold solution, the extent of lead collection increased to 94-99 percent in a single precipitation. However, for the highest accuracy, a second precipitation is recommended for complete collection of lead. The working range of the method is 5-120 micrograms each of lead and bismuth. The precision, expressed as relative standard deviation, is 0.03 microgram lead and 0.05 microgram bismuth. (Little-Battelle)
W74-00281

ANALYSIS OF EXPLOSIVES IN SEA WATER AND IN OCEAN FLOOR SEDIMENT AND FAUNA,
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 05A.
W74-00285

BIS-AROYLHYDRAZONES OF ALPHA--DIKETONES AS REAGENTS FOR COLORIMETRIC AND FLUORIMETRIC DETERMINATIONS OF CALCIUM, CADMIUM AND OTHER CATIONS,
Greenlane Hospital, Auckland (New Zealand). Pathology Dept.
M. Lever.

Analytica Chimica Acta, Vol 65, No 2, p 311-318, July 1973. 3 fig, 3 tab, 3 ref.

Descriptors: Pollutant identification, *Color reactions, *Cations, *Fluorometry, *Colorimetry, *Chemical analysis, Aqueous solutions, Selectivity, Chemical reactions, Zinc, *Calcium, *Cadmium, Fluorescence, Sulfides, Magnesium, Strontium, Aluminum, Copper, Manganese, Alkaline earth metals, Heavy metals, Organic compounds, Methodology.
Identifiers: *Chromogenic reagents, *Bis-aroylhydrazones, Complexing agents, Metal chelates, Cyanides, Chemical interference, Thiols, Barium, Tin, Citrates, Fluorescent spectra, Molar absorptivity, Rare earth elements.

An evaluation has been made of the potential of the bis (4-hydroxybenzoylhydrazones) of glyoxal, methylglyoxal, and dimethylglyoxal as reagents for the colorimetric and fluorometric determination of metallic cations. Bis-aroylhydrazone solutions in 10 mM aqueous NaOH were used to study the effect of cations. The effects of using different bases and of varying their concentrations were investigated. Reagents such as cyanide (20 mM) and citrate (0.2 M) were added to alter the selectivity of the color reactions. Fluorescence measurements were also made in ethanol and other solvents. The bis (4-hydroxybenzoylhydrazones) of glyoxal, methylglyoxal and dimethylglyoxal form colored chelates with Ca (2 plus), Cd (2 plus), La (3 plus), a Bi (III) species and other cations. The glyoxal derivative shows more selective reactions, and highly selective assays are possible for calcium and cadmium in the presence of cyanide and citrate, respectively; Beer's law was obeyed in the range 0-50mM for both cations. The chelates were also fluorescent, the reaction for lanthanum being particularly sensitive. The formation of this type of chelate is a general property of the bis-aroylhydrazones of alpha-diketones. (Holoman-Battelle)
W74-00286

THE SOLVENT EXTRACTION OF THE TERNARY COMPLEXES OF IRON (II)--RHODAMINE B WITH VARIOUS NITROSOPHENOLS. DETERMINATION OF IRON IN WATERS,
Okayama Univ. (Japan). Dept. of Chemistry.
T. Korenaga, S. Motomizu, and K. Toei.
Analytica Chimica Acta, Vol 65, No 2, p 335-346, July 1973. 7 fig, 7 tab, 18 ref.

Descriptors: *Iron, *Water analysis, *Solvent extractions, *Pollutant identification, Separation techniques, Methodology, Chemical reactions, Potable water, Color reactions, Chelation, Hydrogen ion concentration, Chemical analysis, Sodium, Potassium, Magnesium, Calcium, Chlorides, Nitrates, Sulfates, Carbonates, Rivers, Heavy metals, Cations, Anions, Selectivity, Aqueous solutions.
Identifiers: *Rhodamine B, Complexing agents, *Nitrosophenols, *Metal complexes, Absorbance, Chromogenic reagents, Natural waters, Chemical recovery, Sensitivity, Metal chelates, Benzene, Organic solvents, Nitrosonaphthols, Molar absorptivity, Ammonium, Chemical interference, Tiocyanates, Xylenol orange, Chrome azurol S, Pyrocatechol violet.

Twenty nitrosophenols and nitrosonaphthols were examined as reagents for ternary complex formation with iron (II) and rhodamine B. Only reagents containing electron-attracting substituents, such as chloro, bromo, and carboxyl substituents, were satisfactory, and of these, 2-nitroso-4-chlorophenol was best. The ternary complex contains 2-nitroso-4-chlorophenol, iron (II) and rhodamine B in the ratio 3:1:1, and can be readily extracted into benzene. The red extracted complex shows maximal absorbance at 558 nm with a molar absorptivity of 90,000. Beer's law is obeyed over the range 0-0.00001 M iron (II); the pH range for extraction is 4.3-5.3, and the color is stable for at least 1 week. Interference studies with Na, K, Mg, Ca, ammonium, chloride, nitrate, sulfate, and carbonate ions showed that even 10-fold and 100-fold normal concentrations will not interfere with the ternary complex which can be quantitatively extracted into benzene. The application of the method to the determination of iron in potable and river waters is described. (Holoman-Battelle)
W74-00288

MULTIELEMENT INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF BIOLOGICAL MATERIALS,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
R. A. Nadkarni, and G. H. Morrison.
Analytical Chemistry, Vol 45, No 11, p 1957-1960, September 1973. 2 tab, 29 ref.

Descriptors: *Pollutant identification, *Trace elements, Heavy metals, Chemical analysis, Plant tissues, Radioactivity techniques, Methodology, Alkali metals, Alkaline earth metals, Radioisotopes, Neutron activation analysis, Pollutants, Cobalt, Chromium, Copper, Iron, Manganese, Zinc, Molybdenum, Nickel, Sodium, Potassium, Magnesium, Calcium, Fluorine, Bromine, Phosphorus, Sulfur, Mercury, Beryllium, Lead, Cadmium, Aluminum, Chlorine, Strontium, Cesium, Arsenic radiosiotopes, Cadmium radioisotopes, Chlorine radioisotopes, Cobalt radioisotopes, Iodine radioisotopes, Potassium radioisotopes, Strontium radioisotopes, Zinc radioisotopes.
Identifiers: *Instrumental neutron activation analysis, *Biological samples, *Multielemental analysis, Animal tissues, Accuracy, Rare earth elements, Biological materials, Liver, Selenium, Vanadium, Barium, Silver, Arsenic, Antimony, Lithium, Bismuth, Rubidium, Lanthanum, Lutetium, Ytterbium, Scandium, Europium, Detection limits, Orchard leaves.

An INAA method capable of determining up to 36 elements, including many of the essential and toxicological trace elements is described. Since no chemical processing is involved, volatile elements such as As, Br, Cl, Hg, Se, and Sb are not lost in the method. Also, no chemical yields need to be determined for each of the elements determined. The method uses a multielement biological standard during irradiation which is similar in matrix element composition to the samples analyzed. This minimizes differences in neutron self-shielding and absorption effects between the standard and samples, as well as eliminates the task of preparing a large number of synthetic standards. With regard to the capability of determining the essential elements in biological materials, the INAA method has successfully measured Co, Cr, Cu, Fe, Mn, Mo, Se, Zn, Ni, V, Na, K, Mg, and Ca. Because of adverse nuclear properties F, B, P, and S cannot be measured using thermal neutron activation analysis and gamma spectrometry. Iodine and Sn could not be measured in these samples because they are present below the detection limit of the method. Of the toxicological elements, Ba, Ni, Ag, Hg, As, Sb, and Br can be measured by this method. Li, Be, Pb, and Bi cannot be measured because of adverse nuclear properties, and Cd in these samples is below the detection limit. Finally, the INAA method can also determine Al, Rb, Cl, Sr, La, Lu, Yb, Sc, Cs, and Eu in biological samples. (Holoman-Battelle)
W74-00289

SALTING-OUT OF ACETONE FROM WATER -BASIS OF A NEW SOLVENT EXTRACTION SYSTEM,
Kentucky Univ., Lexington. Dept. of Chemistry.
C. E. Matkovich, and G. D. Christian.
Analytical Chemistry, Vol 45, No 11, p 1915-1921, September 1973. 3 fig, 5 tab, 38 ref.

Descriptors: *Salts, *Halides, *Separation techniques, *Aqueous solutions, Solvent extractions, Chemical precipitation, Radioactivity techniques, Calcium chloride, Chemical analysis, Solutes, Calcium hydroxide, Calcium carbonate, Calcium sulfate, Copper sulfate, Magnesium hydroxide, Sodium sulfate, Ammonia, Sodium chloride, Cations, Anions.
Identifiers: *Solvent extraction systems, *Acetone, Organic solvents, Chemical recovery, Metal chelates, Magnesium chloride, Sucrose.

Seventy-nine compounds have been investigated as possible salting-out agents for the separation of acetone from aqueous solutions and its use for solvent extraction of metal chelates. Saturated aqueous salt solutions were prepared from ACS reagent grade chemicals at room temperature and allowed to sit with intermittent agitation for at least 7 days at room temperature before experimentation. Reagent grade acetone was used and Karl Fischer titrations were used to determine the amount of water present in the acetone. Atomic absorption spectrophotometric and radioactivity techniques were used in determining the best salting-out agents. Three of the compounds, calcium chloride, magnesium chloride, and sucrose, were superior in that they were efficient salting-out agents, were not strong complexing agents, their pH could be readily adjusted, and they did not react with many commonly used chelating agents. The solvent extraction of the cobalt-1-pyrrolidinecarbodithioate chelate using calcium chloride as the salting-out agent has been demonstrated using radiotracers. Acetone separated from saturated calcium chloride solution contained 0.321 plus or minus 0.011 percent water (v/v) and 212 ppm salt (wt/v) at equilibrium. Equilibrium was achieved in 2 hr, but could be reached rapidly by centrifuging for 3 min. (Holoman-Battelle)
W74-00290

PROTEIN ADSORPTION BY SUSPENDED SEDIMENTS: EFFECTS OF PH, TEMPERATURE, AND CONCENTRATION,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 05B.
W74-00293

DETECTION OF SALTS OF 2,4-D IN AQUEOUS SOLUTION BY LASTER RAMAN SPECTROSCOPY,
Kentucky Univ., Lexington. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 05A.
W74-00297

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 2. SOUTH ATLANTIC SLOPE AND EASTERN GULF OF MEXICO BASINS.
Geological Survey, Washington, D.C.

Available GPO, Washington, DC 20402 - Price $2.35 postpaid or $2.00 GPO Bookstore. Water-Supply Paper 2092, 1973. 373 p, 1 fig, 39 ref.

Descriptors: *Water quality, *Surface waters, *Basic data collections, *Chemical analysis, *Southeast U.S., Water analysis, Chemical properties, Physical properties, Dissolved solids, Inorganic compounds, Nutrients, Coliforms, Trace elements, Water temperature, Discharge (Water), Sediment yield, River, Lakes, Reservoirs, Estuaries.
Identifiers: *South Atlantic Slope Basins, *Eastern Gulf of Mexico Basins.

Quality of surface waters are presented for the South Atlantic Slope and Eastern Gulf of Mexico Basins for the 1968 water year (Oct. 1967-Sept. 1968). The Geological Survey has published annual records of chemical quality, water temperature, and suspended sediment since 1941. The records are listed by drainage basins in a downstream direction along the main stream. The mineral con-

stituents and physical properties of natural waters reported in the tables of analyses include those that have a practical bearing on water use. The results of analyses generally include silica, iron, calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, fluoride, nitrate, boron, pH, dissolved solids, and specific conductance. Aluminum, manganese, color, acidity, dissolved oxygen, and other dissolved constituents and physical properties (including temperature and sediment yield) are reported for certain streams. Microbiologic (coliforms) and organic components (pesticides, total organic carbon) and minor elements (arsenic, cobalt, cadmium, copper, lead, mercury, nickel, strontium, zinc, etc) are determined occasionally for some streams in connection with specific problems and the results are reported. The source and significance of the different constituents and properties of natural waters are discussed. (Woodard-USGS)
W74-00303

SILICA-CARBONATE ALTERATION OF SERPENTINE: WALL ROCK ALTERATION IN MERCURY DEPOSITS OF THE CALIFORNIA COAST RANGES,
Geological Survey, Menlo Park, Calif.
I. Barnes, J. R. O'Neil, J. B. Rapp, and D. E. White.
Economic Geology, Vol 68, No 3, p 388-398, May 1973. 2 fig, 8 tab, 29 ref.

Descriptors: *Chemical reactions, *Geochemistry, *Water chemistry, *Carbon dioxide, *California, Coasts, Geology, Rocks, Groundwater, Silica, Carbonate rocks, Mercury, Analytical techniques, Rock properties, Geologic formations.
Identifiers: *Serpentine alteration.

Chemical, isotopic, and thermodynamic properties of CO2-rich groundwaters have been measured in the central California Coast Ranges. The acidic CO2-rich waters react with serpentine to form silica-carbonate rock, the host rock of many mercury deposits in the Coast Range of California. In part the waters are of a metamorphic origin and in part the waters are locally derived meteoric waters. The CO2 is entirely derived from metamorphic reactions at depth. Depending on the relative importance of several reactions, the relative abundances of silica and carbonate minerals vary in the silica-carbonate rock. If the CO2-rich fluids react directly with peridotite or dunite, massive magnesite deposits may form. (Woodard-USGS)
W74-00304

ORGANIC POLLUTANT IDENTIFICATION UTILIZING MASS SPECTROMETRY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05A.
W74-00309

PREPARATIVE FREE-FLOW ELECTROPHORESIS AS A METHOD OF FRACTIONATION OF NATURAL ORGANIC MATERIALS,
Geological Survey, Washington, D.C.
J. A. Leenheer, and R. L. Malcolm.
Available from GPO, Washington, D.C. 20402 Price $0.35. Geological Survey Water-Supply Paper 1817-D, 1973. 14 p, 9 ref.

Descriptors: *Electrochemistry, *Organic compounds, *Electrophoresis, Separation techniques, Surface waters, Groundwater, Soil water, Electrodialysis, Ion transport, Water quality control.
Identifiers: *Fractionation.

Preparative free-flow electrophoresis was found to be an efficient method of conducting large-scale fractionations of the natural organic polyelectrolytes occurring in many surface waters and soils. The method of free-flow electrophoresis obviates the problem of adsorption upon a supporting medium and permits the use of high potential gradients and currents because of an efficient cooling system. Separations were monitored by determining organic carbon concentration with a dissolved carbon analyzer, and color was measured by absorbance at 400 nanometers. Organic materials from waters and soils were purified by filtration, hydrogen exchange, and dialysis and were concentrated by freeze drying or freeze concentration. In electrophortic fractionations of natural organic materials typically found in surface waters and soils, color was found to increase with the charge of the fraction. (Woodard-USGS)
W74-00321

SIGMA-INDUCTIVE MODEL VS. FIELD MODEL. OBSERVATION OF A REVERSED ATTENUATION EFFECT,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
C. L. Liotta, W. F. Fisher, E. L. Slightom, and C. L. Harris.
Journal of the American Chemical Society, Vol 94, p 2129-2130, 1972. 1 fig, 2 tab, 11 ref. OWRR B-049-GA (2). NSF Grant No. GP 14437.

Descriptors: *Water chemistry, *Aqueous solutions, *Synthesis, *Chemical reactions, Analytical techniques, Model studies, Operations research, Organic compounds, Hydrogenation, Hydrolysis, Organic acids, Correlation analysis, Evaluation.
Identifiers: Organic base values, Reversed attenuation effect.

Many attempts have been made to distinguish between and evaluate the relative importance of the sigma-inductive and field models of reversed attenuation effects. Perhaps the strongest qualitative evidence for the operation of field effect is the observation of the angular dependence of substituent effects. Several studies involving direct comparison of rigid model systems provide more quantitative evidence for the superiority of the field model in describing the propagation of nonconjugative substituent effects. The first unambiguous example is reported of a reversed attenuation effect--an observation which questions the very foundation of the sigma-inductive model. The field model adequately accounts the experimental facts. Some 5-and 6-hydroxybicyclo- (2.2.2)octane-2-carboxylic acids were synthesized and their pKa values determined in 50% (by weight) aqueous ethanol at 25 deg. The data are summarized. In each of these cases both the substituent and the reaction center are, to a good approximation, in the same steric environment. This implies that the steric approach of solvent molecules to these centers is approximately the same in the three cases. (See also W73-00324)
W74-00323

MECHANISM OF TRANSMISSION OF NONCONJUGATIVE SUBSTITUENT EFFECTS. IV. ANALYSIS OF THE DISSOCIATION CONSTANTS OF 6-SUBSTITUTED SPIRO (3.3) HEPTANE-2-CARBOXYLIC ACIDS,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
C. L. Liotta, W. F. Fisher, G. H. Greene, Jr., and B. L. Joyner.
Journal of the American Chemical Society, Vol 94, p 4891-4897, 1972. 6 fig, 6 tab. OWRR B-049-GA (3). NSF Grant GP 14437.

Descriptors: *Water chemistry, *Aqueous solutions, *Chemical reactions, *Electrochemistry, Polarity, Acids, Alkalis (Bases), Analytical techniques, Organic acids, Temperature, Model studies, Correlation analysis, Evaluation.
Identifiers: Dissociation constants.

The pKa's of eight 6-substituted spiro (3.3) heptane-2-carboxylic acids in 50% (by weight) aqueous ethanol at 25 C are presented. Excellent correlation is obtained between the experimental data and sigma-inductive parameters, whereas only a fair correlation is obtained using the Dewar-Grisdale F parameters. The data are also analyzed by means of the Tanford modification of the Kirkwood-Westheimer cavity model. Excellent agreement between calculated and experimental results is obtained with the spherical cavity model as well as with Stock's modification of this electrostatic model. An analysis is presented which demonstrates that hydrogen and methyl substituents do not exhibit anomalous behavior when compared to more polar substituents by means of the cavity models. Analysis of the limiting models for the propagation of nonconjugative substituent effects (sigma-inductive and field) suggests that the field model is more reliable in explaining the data. (See also W73-00323) (Woodard-USGS)
W74-00324

WATER IN THE SAN LUIS VALLEY, SOUTH--CENTRAL COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02A.
W74-00331

EFFECT OF SALINITY ON THE OPTICAL EXTINCTION OF SEA ICE AT 6328A,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02C.
W74-00333

SOLUBLE PARTICULATES IN ICE FROM SITE 2, GREENLAND,
Nevada Univ., Desert Research Inst., Reno.
For primary bibliographic entry see Field 02C.
W74-00334

AVAILABILITY OF WATER FROM LIMESTONE AND DOLOMITE AQUIFERS IN SOUTHWEST OHIO AND THE RELATION OF WATER QUALITY TO THE REGIONAL FLOW SYSTEM,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 04B.
W74-00336

METHODS OF KARST INVESTIGATION (METODY IZUCHENIYA KARSTA),
A. G. Chikishev.
Izdatel'stvo Moskovskogo Gosudarstvennogo Universiteta, 1973. 92 p.

Descriptors: *Karst, *Investigations, *Analytical techniques, Geology, Geomorphology, Topography, Hydrology, Biology, Aerial photography.
Identifiers: USSR, Karst landforms, Karst processes, Geodesy, Cartography.

Methods commonly employed in the study of karst are analyzed, compared, and evaluated, and new methods or methods borrowed from allied sciences and adapted to karst studies are proposed. These include geological, geomorphological, topogeodetic, hydrological, biological, quantitative, aerial photographic, cartographic, and landscape-indicator methods. (Josefson-USGS)
W74-00345

CALCIUM CARBONATE CEMENTATION OF ALLUVIAL FANS IN SOUTHERN NEVADA,
Cincinnati Univ., Ohio. Dept. of Geology.
L. H. Lattman.
Geological Society of America Bulletin, Vol 84, No 9, p 3013-3028, September 1973. 10 fig, 1 tab, 15 ref.

Descriptors: *Alluvial fans, *Carbonates, *Soil formation, *Calcium carbonate, *Nevada, Diagenesis, Alluvium, Geomorphology, Chemical precipitation, Mineralogy.

Several types of calcium carbonate cement occur on alluvial fans in southern Nevada. Secondary calcium carbonate deposits of pedogenic origin begin as coatings on pebble-size and larger clasts, and progress through calcic horizons to petrocalcic horizons and laminar layers. Nonpedogenic deposits include some laminar layers, gully-bed cementation, and case hardening. The extent and development of cementation are greatest on fans composed of carbonate and basic igneous rock detritus, less on fans built of siliceous sedimentary detritus, and least on fans composed of acid igneous rock material. In a single fan, the best-developed cementation is in the poorly sorted layers of alluvium containing more than 25% material coarser than pebbles. The major source of calcium carbonate deposited on noncarbonate fans is apparently wind-blown silt and sand and, as a result, fans of noncarbonate detritus are best cemented downwind of playas high in carbonates. (Knapp-USGS)
W74-00349

GEOLOGY AND GROUND-WATER RESOURCES OF RUSH COUNTY, CENTRAL KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 04B.
W74-00352

WATER RESOURCES SUMMARY, ISLAND OF HAWAII,
Geological Survey, Honolulu, Hawaii.
For primary bibliographic entry see Field 02E.
W74-00355

A RECONNAISSANCE OF THE WATER RESOURCES IN THE PAHSIMEROI RIVER BASIN, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 02E.
W74-00356

SOME ASPECTS OF THE HYDRODYNAMIC DISPERSION OF SOLUTES IN POROUS MATERIALS,
Rothamsted Experimental Station, Harpenden (England).
For primary bibliographic entry see Field 02G.
W74-00360

DISPERSION-AFFECTED TRANSPORT OF REACTING SOLUTES IN SATURATED POROUS MEDIA: GALERKIN METHOD APPLIED TO EQUILIBRIUM-CONTROLLED EXCHANGE IN UNIDIRECTIONAL STEADY WATER FLOW,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05B.
W74-00364

EFFECT OF INSOLUBLE GRAINS ON LEACHATE FROM POROUS BEDS,
Syracuse Univ., N. Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W74-00379

A COMPARISON OF A WET PRESSURE DIGESTION METHOD WITH OTHER COMMONLY USED WET AND DRY-ASHING METHODS,
Colorado Div. Wildlife, Fort Collins.
For primary bibliographic entry see Field 05A.
W74-00462

DETERMINATION OF ORTHOPHOSPHATE,
Arizona Univ., Tucson. Coll. of Medicine.
For primary bibliographic entry see Field 05A.
W74-00464

THE CHEMISTRY AND QUANTITATIVE UTILITY OF SODIUM COBALTINITRITE IN THE DETERMINATION OF PHENOLS,
Iowa Univ., Iowa City. Coll. of Pharmacy.
For primary bibliographic entry see Field 05A.
W74-00465

ENTHALP, A COMPUTER PROGRAM FOR THE CALCULATION OF AQUIFER CHEMISTRY IN HOT-WATER GEOTHERMAL SYSTEMS,
Geological Survey, Menlo Park, Calif. Geologic Div.
For primary bibliographic entry see Field 02F.
W74-00532

RECONNAISSANCE OF THE WATER RESOURCES OF BEAVER COUNTY, OKLAHOMA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00534

GEOHYDROLOGY OF DONIPHAN COUNTY, NORTHEASTERN KANSAS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00536

WATER RESOURCES OF THE NISQUALLY INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 04A.
W74-00544

2L. Estuaries

PROBABILITIES OF WAVE CHARACTERISTICS IN THE SURF ZONE,
Tetra Tech, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 02H.
W74-00018

TIDAL CURRENTS AND ZIG-ZAG SAND SHOALS IN A WIDE ESTUARY ENTRANCE,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
John C. Ludwick.
Available from the National Technical Information Service as AD-755 735, $3.00 in paper copy, $1.45 in microfiche. Technical Report No. 7, January 1973. 112 p, 22 fig, 9 tab, 56 ref, 3 append. NOOO14-70-C-0083.

Descriptors: *Estuaries, *Sediment transport, Sand bars, *Deposition (Sediments), Sedimentation, *Coasts, *Tidal effects.
Identifiers: *Coastal processes, *Tidal currents, Sand shoals, Chesapeake Bay, Ebb flow, Flood flow, *Tial flushing.

Fourteen 27-hour tidal current stations were occupied in the entrance to Chesapeake Bay in a 40-square mile area of subtidal sand banks and channels where the average water depth is 21 feet. Near the bottom at most stations, flood flow dominates over ebb flow in both peak speed and duration. Velocity profiles from bottom to surface are fitted by a parabolic-shaped velocity defect law from which shear stress at the bed was estimated. With two exceptions, net transport of bed sediment is ebb-directed. Decrease in net sediment transport rate along the path of net motion requires deposition of sediment. Locations of deduced deposition correspond to shoals. Prominent indentations, or sinuses, in the margins of shoals, are strongly dominated by net sediment transport towards the closed end of a channel. Zig-zag shoals extend from the north cape, three-fourths of the distance to the south across the entrance. This line of shoals is comprised of oppositely-opening sinuses, or parabolas, which are with distance to the south alternately ebb-dominated and flood-dominated. The shoals represent spit building action in the presence of strong reversing tidal currents. Other shoals in the entrance are due to subaqueous levee building marginal to main channels. Still other shoals in the entrance are constructed when a flood-dominated channel intersects the ebb-directed path of net sediment transport, the entrapped sediment then being flushed landward to form a secondary shoal when spreading of the flood current occurs. (SinhaOEIS)
W74-00021

WAVE INDUCED CIRCULATION AND LONGSHORE CURRENT PATTERNS IN THE COASTAL ZONE,
Tetra Tech, Inc., Pasadena, Calif.
E. K. Noda.
Available from the National Technical Information Service as AD-750 291, $3.00 in paper copy, $1.45 in microfiche. Report no. TETRAT-P-72-149-3, September 1972. 109 p, 23 fig, 15 tab, 11 ref. 2 append. ONR-NOOO14-69-C-0107.

Descriptors: *Ocean currents, Mathematical models, *Ocean waves, Computer programs, *Coasts, *Beaches, Hydrodynamics.
Identifiers: Coastal zone, *Coastal topography, *Beach profiles, Bottom topography, Momentum flux, Surf zone, *Beach processes, *Near shore processes, *Near shore circulation, Wave incidence.

A theoretical analysis is presented on the generation and stabilization of nearshore, wave-induced circulation and longshore current patterns produced by the interaction of the incoming waves and local bottom topography. This interaction results in a spacial variation of wave characteristics which produces the driving mechanism for nearshore circulation patterns. Both normal and oblique wave incidence are considered with the imposed beach profiles developed from an examination of prototype data. The analytical model results are compared to field measurements and yield optimistic results. (Sinha-OEIS)
W74-00023

A COMPUTER PROGRAM TO ESTIMATE THE COMBINED EFFECT OF REFRACTION AND DIFFRACTION OF WATER WAVES,
Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
H. W. Worthington, and J. B. Herbich.
Available from the National Technical Information Service as PB-194 668, $3.00 in paper copy, $1.45 in microfiche. Sea Grant Publication TAMU-SG-70-219, August 1970. 57 p, 10 fig, 2 tab, 17 ref, 3 append. Grant: NSF-GH-59.

Descriptors: Harbors, *Waves (Water), *Computer programs, *Breakwaters, *Refraction (Water waves).
Identifiers: REDSEA, *Coastal processes, *Near shore processes, *Difffraction (Water waves), Shoaling.

Phenomena are reviewed which generally affect water waves entering a harbor, and the traditional methods of calculating the effects of the 3 principal phenomena - refraction, diffraction and shoaling are discussed. The utility of harnessing the capability of the computer to make the required calculations is illustrated. A computer program is presented which estimates the effects of refraction and diffraction as they combine to change the direction and height of water waves. A unique feature of the program, referred to as

'REDSEA', is that it considers the degree of reflection from the breakwater in calculating the diffraction coefficients. The validity of the predicted results is established by comparing them to experimental data obtained in connection wih this study as well as data from a similar study conducted previously. Applications of the program to design and analysis problems are discussed. (Sinha-OEIS)
W74-00024

GRAVITATIONAL CIRCULATION IN STRAITS AND ESTUARIES,
Washington Univ., Seattle. Dept. of Oceanography.
D. V. Hansen, and M. Rattray, Jr.
Journal of Marine Research, Vol 23, No 2, p 104-122, May 1965. 11 fig, 1 tab, 22 ref. NSF-GP-1101, GP-3549. NONR-477 (10), NONR-477 (37).

Descriptors: *Estuaries, Salinity, Circulation, Ocean circulation, *Straits, Density, Turbulence, Dispersion, Pollutants, Mixing, Tides, Currents (Water).
Identifiers: *Boundary conditions, Similarity solutions, Flushing.

Solutions are presented of the basic differential equations for the central and inner regimes of estuaries; both forced and free convections are considered, and two-dimensional salinity distributions are derived from external parameters. A coupled set of partial differential equations and associated boundary conditions is written to describe circulation and salt-flux processes for estuaries in which turbulent mixing results primarily from tidal currents. Similarity solutions, motivated by characteristic salinity distributions observed in estuaries, are obtained for this set of equations and are compared with observational data. The circulation is separated into modes analogous to the barotropic, baroclinic, and Ekman modes of oceanic circulation. The salinity distribution, although coupled to the velocity distribution, is found to vary independently of it as well. The theoretical results are discussed in regard to: (i) correlation between the vertical variations of mean velocity and salinity, (ii) the role of this correlation in maintaining the steady-state salinity distribution in estuaries, and (iii) some implications for computations of flushing and dispersion of contaminants. (Sinha-OEIS)
W74-00029

EFFECTS OF A NONRIGID, IMPERMEABLE BOTTOM OF PLANE SURFACE WAVES IN SHALLOW WATER,
Texas A and M Coll., College Station.
H. G. Gade.
Journal of Marine Research, Vol 16, No 2, p 61-82, 1958. 12 fig, 5 ref.

Descriptors: *Shallow water, Mathematical models, Friction, Energy loss, Mud, Sediments, Waves (Water), Energy, Bottom sediments.
Identifiers: *Coastal processes, Nonrigid bottoms.

Mutual effects of progressive wave motion in shallow water and in underlying fluid sediments are discussed, with emphasis on modification of the surface wave. The mathematical model is a layer of inviscid fluid overlaying a viscous fluid of greater density and bounded by a horizontal rigid plane. Solutions for locally periodic, simple harmonic disturbances indicate that wave height decays exponentially with travelled distance. The rate of dissipation of energy in the lower layer is proprtional to (a) the wave energy, (b) the ratio of amplitudes at the interface and the surface, and (c) the sine of an angle closely related to the phase difference between profiles at the free surface and the interface. Comparison is made between typical values of water decay due to dissipation in a fluid bottom and that due to friction loss over a rigid sand bottom. Even in a relatively thin layer of mud the dissipation exceeds by far the energy loss due to bottom friction. (Sinha-OEIS)
W74-00030

BIOLOGICAL AND CHEMICAL FEATURES OF TIDAL ESTUARIES,
Oregon State Univ., Corvallis.
H. F. Frolander.
Journal Water Pollution control Federation, Vol 36, No 8, p 1037-1048, August 1964. 7 fig, 2 tab, 14 ref. NONR 1286 (10). NSF GP 622.

Descriptors: Estuaries, *Spatial distribution, *Tidal effects, Zooplankton, Salinity, *Light penetration, Migration, *Turbidity, Water temperature, *Estuarine processes, Oregon, Rhode Island.
Identifiers: Yaquina Bay (Oregon), Narragansett Bay (Rhode Island).

Relationships between zooplankton populations and estuary characteristics are illustrated principally using data from two mid-latitude estuaries on the coasts of the United States; one is Yaquina Bay, Oregon, a landlocked estuary; the other is Narragansett Bay, Rhode Island, a relatively openmouthed estuary. Physical and chemical factors, such as temperature and salinity, set limits of survival and reproduction but, within these limits, the time of day and the relation of the organisms to light, as well as the phase of the tide, will impose additional limits on organisms' spatial distribution. The horizontal translocation of zooplankton organisms is particularly great in long, narrow and shallow estuaries, especially in estuaries with a large tidal prism. Even the phase of the moon is important. It affects tides and resulting differences in speed of tidal currents; the resulting turbidity effects limit light penetration and, thus, change diurnal migration patterns. The light of the moon itself may influence the diurnal migrations and thus, the spatial distribution of species. (Sinha-OEIS)
W74-00031

CHARACTERISTICS OF WAVE RECORDS IN THE COASTAL ZONE,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02H.
W74-00033

COASTAL PROCESSES AND LONG RANGE PLANNING,
Scripps Institution of Oceanography, La Jolla, Calif.
B. M. Brush, and D. L. Inman.
In: Marine Technology Society 8th Annual Conference Preprints, p 215-226, 1972. 6 fig, 12 ref. NOAA SG 2-35208.

Descriptors: Planning, Coasts, *Sediment transport, Sediments, Harbors, Beaches, *Shore protection, Coastal engineering, Management.
Identifiers: *Coastal processes, Coastal energy, Tidal power, Crater sink, *Beach stabilization, Sand ripples, Roughness elements, *Environmental impact, *Littoral processes, Circulation cells.

The topics of coastal management and coastal planning are more frequently in the public conciousness than heretofore. The recent decade has produced new insights into the physical processes of the coastal zone which are of value to policy making as well as to science. These developments now enable remedial methods to be undertaken. This includes existing technology, adaptable methods, and practical future design for retarding the potentially irreversible loss of priceless coastal features. A review of the scope of the interference of manmade works shows that it is difficult to deal with a coastal problem without considering all of the factors concerned. (Sinha-OEIS)
W74-00034

CLIMB OF A BORE ON A BEACH. PART I. UNIFORM BEACH SLOPE,
Brown Univ., Providence, R.I.
D. V. Ho, and R. E. Meyer.
Journal of Fluid Mechanics, Vol 14, No 2, p 305-318, October 1962. 6 fig, 11 ref. NONR 562 (07).

Descriptors: *Beaches, *Shallow water, *Bores, Fluid mechanics, Hydrodynamics, Tides, Slopes.
Identifiers: Similarity solutions, Directional singularity, *Near shore processes, *Coastal processes.

The shoreward travel of a bore into water at rest on a beach of uniform slope is studied to elucidate why, in a class of problems - mainly gas-dynamical ones involving non-uniform shock propagation - similarity solutions seem to act like magnets attracting other solutions. For the shallow-water problem, the real magnet is shown to be the shore singularity of the governing differential equations. The shore singularity of the solution is shown to be a directional singularity of the water acceleration, for a fairly wide range of conditions, and a rather detailed asymptotic approximation for the bore development near shore is deduced. (Sinha-OEIS)
W74-00035

ENVIRONMENTAL STUDIES OF MONTEREY BAY AND THE CENTRAL CALIFORNIA COASTAL ZONE,
Moss Landing Marine Labs., Calif.
R. E. Arnal.
Available from the National Technical Information Service as COM-7210696. Progress Report: July 1971 - February 1972. 94 p, 18 fig, 7 tab. SG 2-35137.

Descriptors: *Plankton, *Hydrography, *Benthos, Fish, *Productivity, *Sediment transport, Sands, Education, *Coasts, *Bays.
Identifiers: Monterey Bay, *Coastal processes, *Near shore processes, Public services.

Details are given of work in progress in plankton studies, hydrographic work, benthic survey, and studies of productivity of fishes as well as sand transport in Monterey Bay. This is followed by explanations of the progress to date in providing additional education in the marine sciences for interested persons as well as information for the general public and public services for the communities of Monterey Bay. (Sinha-OEIS)
W74-00036

SEASONAL VARIATIONS OF COASTAL CURRENTS OFF THE OREGON - NORTHERN CALIFORNIA COAST,
Naval Postgraduate School, Monterey, Calif.
W. F. Whitson.
Available from the National Technical Information Service as AD-749 077, $3.00 in paper copy, $1.45 in microfiche. Master's thesis, June 1972. 52 p, 13 fig, 4 tab, 17 ref.

Descriptors: *Coasts, *Currents (Water), *Upwelling, *Winds, Subsurface flow, *Climate, Ocean circulation, Shallow water, Oregon, California, Pacific coast region.
Identifiers: Surface jet, *Near shore processes, *Coastal processes, Pycnocline, Columbia River discharge, Pressure gradient, Volume transport, Geostrophic velocities, Baroclinic flow.

Seasonal longshore flow patterns are examined at four points along the Oregon-Northern California coast. Summer and winter activity is examined as far seaward as 25 nautical miles and as deep as 200 meters. Long-term mean hydrographic data are used to determine geostrophic velocities. A nearshore baroclinic southward flow is observed at each of the points during the summer. Winter currents are generally very small and largely barotrophic in nature. Seasonal volume transports are presented; corrected velocity profiles are also presented based on data from moored current meters. Qualitiative explantions of the observed phenomena are considered. (Sinha-OEIS)

W74-00037

LONG TERM CHANGES IN MARINE ECOSYSTEM: ECOLOGICAL RELATIONSHIPS BETWEEN TOMALES BAY AND ADJACENT SHELF WATERS,
University of the Pacific, Dillon Beach, Calif. Pacific Marine Station.
S. J. Marcus, R. S. Houston, and E. H. Smith.
Final Report, March 31, 1972. 50 p, 19 fig, 1 tab, 1 ref, 3 append. Proj. NR 104-931 ONR 00014-67-A-0291-0001.

Descriptors: Ecology, *Coasts, *Bays, Continental shelf, Data collections, *Upwelling, Marine fisheries, Ecosystems, Commerical fishing.
Identifiers: Tomales Bay, Density structure, *Coastal processes, *Near shore processes.

An offshore measurement capability was developed along with the initial stage of data collection in the region adjacent to Tomales Bay. Preliminary analysis indicates that several cycles of coastal upwelling having a period of 5 to 6 weeks were observed by sequential measurements during the fall and winter months of 1969-1970. A low-cost operational capability has been achieved for the study of detailed density structure of shelf waters. Results not only provide some understanding of the processes affecting Tomales Bay, but indicate a possible relationship of the density structure to the movements of commercially important fish in the area. (Sinha-OEIS)
W74-00038

CAPACITIES OF SHALLOW WATERS OF SAGAMI BAY FOR OXIDATION AND REDUCTION OF INORGANIC NITROGEN,
Tokyo Univ. (Japan). Ocean Research Inst.
For primary bibliographic entry see Field 05B.
W74-00047

BASELINE CONCENTRATIONS OF LIGHT HYDROCARBONS IN GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-00073

EXPERIMENTAL HYDRODYNAMIC CALCULATION OF APERIODIC WATER-LEVEL FLUCTUATIONS IN ESTUARIES,
V. V. Ivanov, and Ye. P. Kotrekhov.
Soviet Hydrology: Selected Papers, No 4, p 354-362, 1971. 4 fig, 9 ref. Translated from Problems of the Arctic and Antarctic (Problemy Arktiki i Antarktiki), No 38, p 45-55, 1971.

Descriptors: *Estuaries, *Water level fluctuations, *Frequency, *Hydrodynamics, Unsteady flow, Waves (Water), Wind tides, Surges, Channel morphology, Discharge (Water), Cross-sections, Profiles, Equations.
Identifiers: *Yenisey River estuary (USSR).

Level fluctuations in estuaries depend on aperiodic and periodic sea level fluctuations and variations in river runoff. Using the Yenisey River as an illustration, hydrodynamic equations of unsteady flow were applied to the calculation of wind tides in an estuary reach typical of estuaries of large Siberian rivers. To study propagation of wind-induced level fluctuations in the Yenisey estuary, a large number of surges were calculated on the M-220 computer. Results are presented of calculations for one flood and ebb wave dexcribed by stage observations at a number of gaging stations and by discharge measurements. Hydromorphometric characteristics of the Yenisey River estuary are graphed for an average discharge of 20,100 cu m/sec and average sea level. (Josefson-USGS)
W74-00114

EFFECTS OF UNDERWATER DEMOLITION ON THE ENVIRONMENT IN A SMALL TROPICAL MARINE COVE,
Naval Underwater Systems Center, New London, Conn. New London Lab.
For primary bibliographic entry see Field 05C.
W74-00233

COMPOSITIONAL STUDIES OF A HIGH-BOILING 370-535 C DISTILLATE FROM PRUDHOE BAY, ALASKA, CRUDE OIL,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 05A.
W74-00258

ASSOCIATION OF HYDROCARBONS AND MINERAL PARTICLES IN SALINE SOLUTION,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 05B.
W74-00265

ORGANOCHLORINE RESIDUES IN ESTUARINE MOLLUSKS, 1965-72 - NATIONAL PESTICIDE MONITORING PROGRAM,
Environmental Protection Agency, Gulf Breeze, Fla. Office of Pesticide Programs.
For primary bibliographic entry see Field 05C.
W74-00291

IN SITU MEASUREMENT OF SEDIMENT SOUND SPEED DURING CORING,
Texas Univ., Austin. Applied Research Labs.
For primary bibliographic entry see Field 02J.
W74-00294

SEA-SURFACE CIRCULATION, SEDIMENT TRANSPORT, AND MARINE MAMMAL DISTRIBUTION, ALASKA CONTINENTAL SHELF,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 02J.
W74-00298

A SYSTEMATIC SURVEY OF INTERTIDAL OYSTERS IN THE SAVANNAH RIVER BASIN AREA OF SOUTH CAROLINA,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
For primary bibliographic entry see Field 05C.
W74-00300

PATTERNS OF SEDIMENT TRANSPORT AT NEARSHORE ZONES INFLUENCED BY WAVE AND TIDAL CURRENTS: A STUDY UTILIZING FLUORESCENT TRACERS,
Skidaway Inst. of Oceanography, Savannah, Ga.
G. F. Oertel.
Southeastern Geology, Vol 15, No 2, p 77-92, July 1973. 6 fig, 14 ref. USACE Contract DACW 72-68-C-0030, NSF Grant GA-30565.

Descriptors: *Beaches, *Sediment transport, *Waves (Water), *Tides, Surf, Sedimentation, Sedimentary structures, Sedimentology, Surges, Littoral drift, Currents (Water).

In nearshore zones, responses of detritus to moving water illustrate several different transportational and depositional patterns depending on the nature of the interactions between wave surge and tidal flow. At offshore, shallow, subtidal areas the greatest distances of sediment transport generally correspond to the direction of tidal flow, while bedform configurations are predominantly effected by wave surges. At offshore intertidal areas, bedform configurations and the greatest distances of sediment transport are largely controlled by surging waves. During the flooding tide, the approach directions of surging waves determine the bedform configurations and the greatest distances of sediment transport. When wave surge and tidal currents are in opposing directions (during the ebbing tide), sediment is entrained in gyral paths. These sediment gyres cause deposition of sand in the horizontal strata of planar beds. At the shorelines adjacent to the estuary entrances, tidal currents and wave currents are in mutually evasive zones and patterns of sediment entrainment generally conform to the directions of the water flow in the respective zones. When tidal currents and longshore currents are in opposite directions, then the entrainment of sediment corresponds to the bipolar flow directions in the respective current zones. (Knapp-USGS)
W74-00301

TIDAL RELATIONS ALONG THE INTRACOASTAL WATERWAY, PALM BEACH, COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. J. Schneider.
Open-file Report 73021, 1973. 22 p, 6 fig, 2 tab, 4 ref.

Descriptors: *Tides, *Inland waterways, *Florida, *Tidal waters, *Water level fluctuations, Diurnal, Sea level, Ocean currents, Data collections, Time.
Identifiers: *Tidal data, *Palm Beach County (Fla.), High tide, Low tide, Tidal range, Tidal time difference, Intracoastal waterway.

Prior to this investigation there was little tidal data for the Intracoastal Waterway in Palm Beach County, Florida. The purpose of this study, therefore, was to determine for this reach of the waterway: (1) mean high water; (2) mean low water; (3) mean sea level; (4) mean half tide; (5) mean tidal range; and (6) average tidal time difference, and to relate these values to the ocean tides at Miami Beach. From September 1, 1971 through August 31, 1972, mean high water along the Intracoastal Waterway in Palm Beach County ranged from 1.71 to 1.87 feet above mean sea level, datum of 1929. The mean tidal range varied from 2.33 to 2.69 feet. The difference between half tide and mean sea level varied between -0.01 foot at Delray Beach to +0.05 foot at Juno Beach with a zero variation at Southern Blvd. and Blue Heron Blvd. The average time difference for high tides referred to Miami Beach, ranged from plus 20 minutes at Riviera Beach to plus 1 hour and 50 minutes at Delray Beach. (Woodard-USGS)
W74-00328

LAND USE AS A FACTOR IN COASTAL WATER QUALITY,
California Univ., Berkeley.
P. H. McGauhey.
In: Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972. Sponsored by Coastal Engineering Research Council and Waterways, Harbours and Coastal Engineering Division. p 2091-2097 (1972).

Descriptors: *Land use, *Water quality, *Coasts, Hawaii, Estuaries, Seashores, Urbanization, Water pollution effects, Water quality control, Standards, Institutional constraints, Social aspects.
Identifiers: *Coastal zone.

More knowledge of land use, development, and management practices is needed to ascertain their effect on coastal waters. It is also necessary to know enough about natural shifts in ecosystems and what kind of ecosystems should be maintained, or can be maintained, to make intelligent tradeoffs between land and water quality decisions. Reexamination should be made of degree of freedom that goes with the land to adapt it to a population load now bringing these waters to a condition of great concern. A Hawaiian study is developing criteria to relate coastal water quality to land management practices and to evaluate coastal zone resources both landward and seaward

of the shoreline. This affords an opportunity to establish some baseline against which to evaluate human activity on land--a need that can not be overemphasized. There are situations such as Kaneohe Bay where intense urbanization of a coastal valley has occurred, and changes in water quality and biota have been observed in the presence of treated sewage. Plans to discharge sewage elsewhere are in progress and the opportunity is developing to observe changes in the environment and in the biota when only urban runoff afflicts the waters. (Jones-Wisconsin)
W74-00383

AN EVALUATION OF MIXING IN THE TAY ESTUARY,
East of Scotland Water Board, Invergowrie (Scotland).
J. R. West, and D. J. A. Williams.
In: Proceeding of 13th Coastal Engineering Conference, July 10-14, 1972, Sponsored by Coastal Engineering Research Council and Waterways Harbours and Coastal Engineering Division. p 2153-2169 (1972). 9 fig.

Descriptors: *Mixing, *Estuaries, *Mathematical models, *Salinity, *Dispersion, Tidal effects, Flow characteristics, Saline water intrusion.
Identifiers: *Firth of Tay (United Kingdom).

A one dimensional form of the solute mass balance equation to obtain a mathematical representation of salinity distribution in the Tay Estuary (United Kingdom) is described. An apparent coefficient of dispersion and a net mixing term are defined, evaluated, and correlated to fluvial discharge and distance along the estuary. Reference is made to the proper reduction of dimensionality and time averaging of the instantaneous three dimensional solute mass balance equation. The conditions of significant tidal variation of both channel cross sectional area and solute concentration are recognized. This equation is a useful preliminary approach to the study of mixing in an estuary. While unsatisfactory from a physical point of view, the introduction of an apparent dispersion coefficient provides, along with other functions, an algebraic representation of the effects of processes that lead to what is here called the net mixing. The yield of physical information is limited to an estimate of the net effects of the physical processes of solute transport over a tidal cycle. In the Tay Estuary the apparent dispersion coefficient and net mixing are highly dependent upon distance along the estuary and mean river flow. (Jones-Wisconsin)
W74-00384

A NUMERICAL MODEL OF THE ST. LAWRENCE RIVER,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Lab.
D. Prandle.
In: Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B.C., Sponsored by Coastal Engineering Research Council and Waterways, Harbours and Coastal Engineering Division, p 2291-2305 (1972). 8 fig.

Descriptors: *Estuaries, *Mathematical models, *St. Lawrence River, Tidal effects, Flow characteristics, *Canada, Water levers, Velocity, Tides, Analytical Techniques.

A combined one and two-dimensional model of a 340-mile section of the St. Lawrence River was formulated, employing an explicit finite difference solution. A half mile square grid was used to schematize an area approximately 20 miles long by 15 miles wide. The two-dimensional model was embodied within the one-dimensional model permitting free interaction of flow across the boundaries. By combining the two models an accurate simulation of a particular short reach of a river was achieved. This technique has widespread applications subject to limitations of the two-dimensional model. The problem of flow visualization associated with numerical models was examined. For the one-dimensional model use of contours to represent water elevation plotted against time and distance along the river was found extremely useful. For the two-dimensional model animation techniques were used. A movie film was made that demonstrates both tidal rise and fall and associated horizontal velocities. Elevation was reproduced by use of colored paper to simulate contours, velocities were represented by simulating drogue movement to produce smoke streaks. (Jones-Wisconsin)
W74-00385

ANALYTICAL MODELING OF ESTUARINE CIRCULATION,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
J. S. Fisher, J. D. Ditmars, and D. R. F. Harleman.
In: Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B.C., Sponsored by Coastal Engineering Research Council and Waterways, Harbours and Coastal Engineering Division, p 2307-2317 (1972). 2 fig.

Descriptors: *Analytical techniques, *Mathematical models, *Estuaries, *Circulation, Distribution, Salinity, Velocity, Tidal effects, Equations, Flow, Freshwater, Shoals.

A two-dimensional analytical model of estuarine circulation including vertical and longitudinal distributions of velocity and salinity is developed. Relationships between the various time-averaged coefficients of turbulent diffusion and eddy viscosity are included and gross parameters of estuarine circulation obtained. Flow is assumed laterally homogeneous and the estuary width and depth are assumed to be functions of the longitudinal coordinate only. Salt intrusion length, ocean boundary salinity, distribution of depth-averaged salinity and freshwater discharge are required inputs to the model. The vertical and longitudinal equations of motion, continuity, salt conservation and an equation of state are the governing equations included. The key assumption is made that longitudinal salinity gradient is independent of depth. This decouples these equations and thus permits an analytical solution. The model solutions, from data of laboratory flume and field surveys, are used to find correlations for the mean vertical transfer coefficients of mass and momentum with gross characteristics of the estuary. These correlations, plus results from a one-dimensional numerical model, permit this analytical model to be used as predictor of velocity and salinity profiles in estuaries and to relate changes in freshwater discharge to possible changes in the location of shoaling zones. (Jones-Wisconsin)
W74-00386

ELECTRICAL RESISTIVITY SOUNDINGS ON THE COASTAL PLAIN OF SOUTHEASTERN VIRGINIA: A FEASIBILITY STUDY,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 02F.
W74-00437

ZOOBENTHOS RESOURCES AND PRODUCTIVITY IN THE GULF OF TAGANROG, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
For primary bibliographic entry see Field 05C.
W74-00495

SEMIDIURNAL INTERNAL TIDES IN MASSACHUSETTS BAY,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Oceanographic Labs.
D. Halpern.
Journal of Geophysical Research, Vol 76, No 27, p 6573-6584, September 20, 1971. 7 fig, 3 tab, 31 ref.

Descriptors: Temperature, *Gravity waves, *Bays, *Coasts, Massachusetts, Measurement, Tidal waters.
Identifiers: *Massachusetts Bay, *Internal tides, *Temperature measurement, Tidal cycles, Wave energy.

Semidiurnal tidal internal gravity waves consisting of the first five modes account for over 50% of the fluctuations that occurred in temperature measurements made at fixed depths in Massachusetts Bay. The amplitude of the lowest mode is the largest, while that of the second mode is negligible. The minimum value of the Richardson number of the internal wave of five modes is unity, and there is an indication that during each tidal cycle a dynamic instability may occur. The total internal wave energy occurring in a bandwidth of .00732 cph, centered on the semidiurnal frequency, is approximately 430,000 ergs/sq cm, which is about 8.6% of the total energy of the barotropic tide. These results, which were deduced from linear theory, may not be entirely accurate because the asymmetry of the temperature trace suggests nonlinear wave profiles, and because of the possible presence of microstructure. (Sinha-OEIS)
W74-00504

ON THE ANGULAR ENERGY SPECTRUM OF WIND WAVES,
For primary bibliographic entry see Field 02E.
W74-00505

WATER-LEVEL FLUCTUATIONS AND FLOW IN TIDAL INLETS,
National Engineering Science Co., Pasadena, Calif.
J. Van de Kreeke.
Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 93, No WW4, Proceedings Paper 5575, p 97-106, November 1967. 6 fig, 5 ref, append.

Descriptors: *Inlets (Waterways), Tides, *Water level fluctuations, Mathematical models, Coasts, *Australia, Equations.
Identifiers: *Tidal inlets, *Water motion, *Tasmania (Macquarie Harbour), Fresh water inflow.

Equations are derived to describe the water motion in a tidal inlet connecting the ocean with a relatively small basin. The boundary conditions considered are the ocean tide and fresh water inflow. No density effects are taken into account. A dimensionless resistance coefficient is introduced to express the influence of the inlet channel resistance on the water motion. A numerical method to solve the equations is presented. For a better physical insight, the analytic solution is presented for a simplified set of equations, in which the quadriatic resistance term is replaced by a linear term. It appears that after a certain transition period the water level fluctuations in the bay become steady, the 'steady state' fluctuations being independent of the initial conditions. Numerical computations are carried out for the inlet of Macquarie Harbour, Tasmania. The results, for a case in which no fresh water inflow is considered, are compared with the results obtained according to Keulegan's method and with the results obtained with the help of the simplified (linear) set of equations. They appear to be in close agreement. (Sinha-OEIS)
W74-00507

TIDAL CHARACTERISTICS OF TWO ESTUARIES IN FLORIDA,
For primary bibliographic entry see Field 05B.
W74-00508

THE EQUATIONS OF MASS CONTINUITY AND SALT CONTINUITY IN ESTUARIES,
Johns Hopkins Univ., Md. Chesapeake Bay Inst.
D. W. Pritchard.
Journal of Marine Research, Vol 17, p 412-423, 1958. 3 ref.

Descriptors: *Estuaries, Mathematics, Tidal effects, Equations, Mass, Equation.
Identifiers: *Estuarine processes, *Mass continuity, *Salt continuity, Slack water, Phase difference.

Equations of mass (or volume) continuity and salt continuity are developed for the two- and one-dimensional estuary from the basic forms of these equations in three dimensions. The three cases of vertical, lateral, and sectional homogeneity are treated. Some misuses of the continuity concepts as applied to estuaries have appeared in recent literature. These are discussed. The effect of phase difference between tidal slack water and high tide on the nontidal drift in sectionally homogeneous estuaries is presented. (Sinha-OEIS)
W74-00510

CLASSIFICATION SYSTEM FOR ESTUARIES,
Norconsult A/S., Oslo (Norway).
B. Glenne.
Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 93, No WW1, Proceedings Paper 5084, p 55-61, February 1967. 5 fig, 8 ref.

Descriptors: *Estuaries, *Tidal effects, Mixing, Diffusion, *Classification, Friction, Stratification, Hydrology, *California, Coasts.
Identifiers: Advective flow, *San Francisco Bay.

An attempt is made to improve the communications between estuarine investigators by providing a classification system for natural occurring estuaries, based on readily measurable physical parameters. Because quantitative information regarding mixing processes is presently relatively sparse, the classification system is based mainly on hydrographical, tidal, and hydraulic parameters. The classification system is schematically pictured and quantitatively defined wherever possible. (Sinha-OEIS)
W74-00511

NATURAL INDICATORS OF ESTUARINE SEDIMENT MOVEMENT,
Oregon State Univ., Corvallis. Dept. of Oceanography.
J. V. Byrne, and L. D. Kulm.
Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 93, No WW2, Proceedings Paper 5220, p 181-194, May 1967. 8 fig, 3 tab, 14 ref. ONR Contract Nonr 1286 (10).

Descriptors: *Sediment transport, *Estuaries, *Beaches, Near shore, Bays, Tidal effects, Sedimentation, Runoff, *Littoral drift, Winds, *Oregon, Seasonal.
Identifiers: *Yaquina Bay (Ore.), *Near shore processes, Tidal currents, Onshore winds, Tidal flats.

Sediment movement within Yaquina Bay, Oregon, has been determined through the use of sediment texture and composition and related to the hydrography of the estuarine system. These natural indicators reveal at least two major sources of sediment - a river source and a beach or nearshore source. Marine sands are introduced into the bay by tidal currents or by onshore winds and transported upstream six miles from the bay entrance. Sands from the Yaquina River remain within the estuary while the suspended silts and clays are deposited primarily on tidal flats or carried out to sea on the ebb tide. Sedimentation in Yaquina Bay appears to be largely seasonal. Maximum deposition occurs during the winter and spring when river runoff is highest. During these seasons littoral drift, coastal winds, and estuarine hydrographic system promote the transport of beach or nearshore marine and dune sands into the estuary. During summer and fall, deposition is slight due to less favorable climatic and hydrographic conditions. (Sinha-OEIS)
W74-00512

INITIAL WAVE SCATTERING BY AN INHOMOGENEOUS MEDIUM AND ITS APPLICATION TO SHALLOW WATER WAVES,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
E. J. Katz.
Journal of Geophysical Research, Vol 67, No 12, p 4713-4719, November 1962. 1 fig, 6 ref. Nonr 248 (56).

Descriptors: *Shallow water, *Tsunamis, *Waves (Water), *Coasts.
Identifiers: *Near shore processes, *Wave scattering, Inhomogeneous medium.

The initial scattering of a scalar wave function by a statistically homogeneous medium is discussed for an unspecified, scattering, source distribution. The angular distribution of scattered energy and the attenuation of the incident wave energy are obtained which, in a three-dimensional space, yield Batchelor's earlier results. The comparison provides an estimate of the region included in his far field approximation. The present analysis is then applied to a class of scattering problems which includes the scattering of shallow water waves by a random depth. With the acid of a particular spectral function for the depth autocorrelation, an inadequacy of the single scattering technique (first Born approximation) is high-lighted for certain large-scale inhomogeneities. It is then quantitatively suggested that an important shallow ocean wave (a tsunami) cannot be studied by single scattering. (Sinha-OEIS)
W74-00513

A METHOD FOR DETERMINING THE BEHAVIOR OF LONG WAVES CLIMBING A SLOPING BEACH,
North Carolina State Univ., Raleigh Dept. of Civil Engineering.
For primary bibliographic entry see Field 02G.
W74-00515

FORMATION OF THERMAL MICROSTRUCTURE IN A NARROW EMBAYMENT DURING FLUSHING,
Washington Univ., Seattle. Applied Physics Lab.
J. T. Shaw, and G. R. Garrison.
Journal of Geophysical Research, Vol 64, No 5, p 533-539, May 1959. 6 fig, 2 ref.

Descriptors: *Thermal stratification, Seasonal, *Coasts, *Bays, *Washington.
Identifiers: *Puget Sound (Wash.), Flushing, Embayments, Temperature measurements, *Near shore processes, Isothermal diagrams.

Thermal microstructure formations, coincident with the occurrence of flushing in a narrow Puget Sound embayment, have been observed and measured with a high-sensitivity probe. Accompanying the larger formations which extend horizontally for thousands of yards, a microstructure is shown to exist which consists of elongated layers extending hundreds of yards with temperature differences of less than 0.1 degree C. Two series of isothermal diagrams constructed from vertical temperature measurements taken in the area during winter and summer flushing are presented to show the manner in which such formations are developed. (Sinha-OEIS)
W74-00517

WAVE REFRACTION PATTERNS IN HAWKE BAY,
Department of Scientific and Industrial Research, Wellington (New Zealand). Oceanographic Inst.
J. G. Gibb.
New Zealand Journal of Geology and Geophysics, Vol 5, No 3, p 435-444, August 1962. 6 fig, 1 tab, 6 ref.

Descriptors: *Waves (Water), *Refraction, *Shallow water, Surf, Harbors, *Coasts, *Bays.
Identifiers: Near Shore processes, *New Zealand (Hawke Bay), Snell's law.

When a wave originating in deep water enters shallow water, i.e., water whose depth is less than half the wavelength, the velocity of the wave is reduced. Refraction, i.e., the distortion of wavefronts by wave-velocity changes, will therefore occur when a wave-front enters shallow water. The process is analogous to the bending of light rays in optical systems, and the relations are expressed by Snell's law. Wave refraction diagrams are presented and discussed for Hawke Bay and for two nearshore areas within the Bay. Generally there are no marked refraction effects in the Bay as a whole, except near Cape Kidnappers and Portland Island. In the Napier Harbour area, Pania Rock and adjacent banks are the principal factors affecting the smooth pattern of wave fronts. For the Clifton-Awatoto area the direction of longshore currents produced by the refracted waves is shown to be predominantly northward. (Sinha-OEIS)
W74-00518

STUDIES ON THE CURRENTS IN THE LITTORAL ZONE OF THE WALTAIR BEACH,
Andhra Univ., Waltair (India). Dept. of Meteorology and Oceanography.
For primary bibliographic entry see Field 02J.
W74-00519

COASTAL PROCESSES AROUND THE OTAGO PENINSULA,
Otago Univ., Dunedin (New Zealand). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-00521

SALINITY OF INTERSTITIAL WATER IN A SANDY BEACH,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
R. G. Johnson.
Limnology and Oceanography Vol 12, No 1, p 1-7, January 1967. 1 fig, 3 tab, 12 ref.

Descriptors: *Salinity, Circulation, *Beaches, *Tidal effects, Bays, *Shallow water, Sands, *California.
Identifiers: *Tomales Bay (Calif), Intertidal sand, Tidal cycle.

The salinity in the upper 20 cm of intertidal sands was observed at two stations in Tomales Bay, California. In summer, there were no striking variations associated with elevation, except for the effect of evaporation. In winter, the influx of freshwater provides sufficient contrast between interstitial and open water to reveal features of circulation. High on the beach, the interstitial salinity at the 10- and 20-cm depth remains low through the tidal cycle. The salinity at 10 cm remains higher than at 20 cm. At an elevation of 1.0 m, the salinities at 10 and 20 cm converge. Below this elevation, interstitial salinity varies less than in the adjacent open waters of the bay. The environment of the infauna of the low intertidal zone is more stable than that of epifaunal or pelagic organisms in shallow water. The variations high in the intertidal zone must constitute a major obstacle to the spread of marine organisms into this area. (Sinha-OEIS)
W74-00523

EFFECTS OF THE ALASKA EARTHQUAKE AND TSUNAMI ON RECENT DELTAIC SEDIMENTS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02J.
W74-00524

TIDAL VARIATION OF THE SIZE DISTRIBUTION OF SUSPENDED SEDIMENT AT A STATION IN THE CHESAPEAKE BAY TURBIDITY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. R. Schubel.
Netherlands Journal of Sea Research, Vol 5, No 2, p 252-266, 1971. 8 fig, 5 tab, 3 ref.

Descriptors: *Sedimentation, *Deposition (Sediments), *Estuaries, *Coasts, *Turbidity, Tidal effects, *Chesapeake Bay.
Identifiers: Suspended sediments, *Tidal cycle, Size distribution.

The results of sedimentation size analyses of samples collected over a tidal cycle at a station within the turbidity maximum of the Chesapeake Bay are presented. The suspended particle population consists of two sub-populations - those particles in more or less continual suspension throughout the water column, and those particles alternately suspended and deposited. The background particles (stable volume-size distribution) are derived in part directly from run off; and in part from primary productivity, from shore erosion, and from resuspension. These very fine-grained particles have a volume weighted mean settling velocity of the same order as the mean vertical mixing velocity. This appears to explain their narrow, stable size distribution, and their sustained suspension. (Sinha-OEIS)
W74-00525

A TEST OF MIXING LENGTH THEORIES IN A COASTAL PLAIN ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
R. E. Kent, and D. W. Pritchard.
Journal of Marine Research, Vol 18, No 1, p 62-72, June 30, 1959. 4 fig, 1 tab, 8 ref.

Descriptors: *Estuaries, Coasts, *Mixing, Density, *Stratification, Wind, Salinity, Circulation, *Virginia, *Coastal plains.
Identifiers: Estuarine processes, Wind waves, *Mixing length, James River estuary.

The purpose was to demonstrate that the mixing length associated with vertical diffusion of salt in a stratified estuary may be formulated in terms of the stability of the system and of an adiabatic mixing length determined by the geometry of the system. Observations of vertical and horizontal variations in salinity and velocity in the James River estuary have been previously employed in the indirect determination of the vertical eddy flux of salt (Pritchard, 1954). This term is employed here to compute a mixing length after the definition of Prandtl. It is shown that this observed mixing length is qualitatively similar to a theoretical one formulated from the geometry of the system and a stability parameter related to the density stratification of the system. Several alternate hypotheses regarding the theoretical mixing length are tested. Better quantitative agreement is obtained when the influence of surface wind waves is included in the formulation of the theoretical mixing length. (Sinha-OEIS)
W74-00528

APPLICATION OF ECOLOGICAL, GEOLOGICAL AND OCEANOGRAPHIC ERTS-1 IMAGERY TO DELAWARE'S COASTAL RESOURCES PLANNING,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 07B.
W74-00540

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

ANALYTICAL AND EXPERIMENTAL STUDIES OF REVERSE OSMOSIS SYSTEMS,
Clarkson Coll. of Technology, Potsdam, N.Y.
B. Bansal, R. DeLuca, L. J. Derzansky, A. K. Dewan, and R. Mehandra Doshi.
Available from the National Technical Information Service as PB-222 118, $9.75 in paper copy, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Report No 854, May 1973. 146 p, 39 fig, 11 tab, 59 ref. append. Contract 14-01-0001-1816.

Descriptors: *Desalination, *Reverse osmosis, *Membranes, Boundary layers, Viscosity, Diffusivity, Laminar Flow.
Identifiers: *Concentration polarization, Hollow fibers, Tubular membranes.

The report is divided into four chapters as follows: (1) The Effice of Concentration Dependent Viscosity and Diffusivity on Concentration Polarization in Reverse Osmosis Flow Systems. (2) Reverse Osmosis: Increased Productivity by Reduction of Concentration Polarization in Laminar Flow Reverse Osmosis Using Intermediate Non-Rejecting Membrane Sections. (3) Hollow Fiber Reverse Osmosis Systems Analysis and Design. (4) Experimental Studies of Reverse Osmosis with Tubular Membranes. (OSW)
W74-00039

EVALUATION OF THE RELIABILITY AND MAINTAINABILITY OF DESALTING PLANTS.
Hittman Associates, Inc., Columbia, Md.

Available from the National Technical Information Service as PB-221 121, $11.00 in paper copy, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Report No 859, August 1972. 164 p, 48 ref, 29 tab, 47 ref. Contract 14-30-2848.

Descriptors: Standards, Distillation, *Desalination, Brines, *Flash distillation, Evaluation.
Identifiers: Product water, Water production, Heat rejection, *Reliability, *Maintainability.

Results are presented of applying reliability and maintainability engineering analysis techniques to the 2.5 MGD Universal Desalting Plant design for a multistage flash seawater distillation plant and evaluating the economics of applying these techniques in other programs. A 14 percent increase in predicted availablility, from 77 to 88 percent, results from design modifications to critical component areas. The modifications result in a 9 percent decrease in product water cost, from 140cent/1000 gallons to 128cent/1000 gallons. An interative analysis is defined for optimizing product water cost with respect to availability. A plan is presented for developing a formal reliability and maintainability engineering program in the Office of Saline Water. (OSW)
W74-00040

DESALINATION PROCESS,
Rohm and Haas Co., Philadelphia, Pa. (Assignee)
F. J. Glavis, and D. H. Clemens.
U.S. Patent No. 3,753,898, 4 p, 4 ref; Official Gazette of the United States Patent Office, Vol 913, No 3, p 948, August 21, 1973.

Descriptors: *Patents, *Desalination, Saline water, Potable water, *Polymers, *Polyelectrolytes, *Ion exchange, *Water treatment, Treatment.

Saline water is contacted with polyelectrolyte insoluble in acid solution. The polyelectrolyte is a cross-linked polymer having ion exchange properties. It has a glass transition temperature, i.e. a Tg, in the dry state of at least about 25 degrees C and up to about 65 degrees C. The polymer preferentially sorbs water from the saline water and forms a hydrate with it. The solute concentration in the remaining saline water is increased, removing the resulting hydrated polymer from the remaining saline water. The hydrated polymer is heated to at least 10 degrees C above the datum temperature and removes purer water from the polyelectrolyte. The purified water is thermally released from the polymer and the polymer is used over again. Cross-linked acrylic polymers are preferred. (Sinha-OEIS)
W74-00081

MEMBRANE PROCESSES (OSMOSIS AND REVERSE OSMOSIS),
Yugoslav Academy of Sciences and Arts, Dubrovnik. Inst. for Marine Corrosion and Desalination.
B. Kunst, G. Arneri, P. Goran, and A. M. Basnec.
Available from the National Technical Information Service as PB-219 393, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 84, March 1973. 39 p, 10 fig, 14 tab, 7 ref. 14-01-0001-1427.

Descriptors: *Desalination, *Reverse osmosis, *Membrane processes, *Permselective membranes, *Osmosis, Sea water, Evaporation, Solvents.
Identifiers: Cellulose acetate.

The research has two main goals: (1) the development of more productive osmotic and reverse osmotic membranes for the sea water desalination, and (2) an optimal design of elements for osmosis and reverse osmosis units. Previous work on the general problem of making more productive reverse osmosis membranes resulted in new classes of porous cellulose acetate reverse osmosis membranes for low pressure work of highly increased (100%) productivities, as well as in a new concept on the mechanism of membrane formation, named solution structure - evaporation rate concept. In this concept the state or the struture of the casting solution and the rate of solvent evaporation during film formation together constitute important related variables governing the ultimate porous structure and hence the performance of the resulting membranes in reverse osmosis. Investigations were undertaken to further the understanding of the mechanism of the membrane formation process. Changes in reverse osmosis membrane performances caused by including another solvent, dioxane, as a substitution for a part of acetone in a casting dope were studied. Apparatus was constructed, built and tested for the solvent evaporation rate measurement. (OSW)
W74-00145

ION-SELECTIVE ELECTROCHEMICAL SENSORS,
Texas Instruments, Inc., Dallas.
I. Trachtenberg.
Available from the National Technical Information Service as PB-219 394, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 844, March 1973. 104 p, 26 fig, 18 tab, 24 ref. 14-01-0001-1737.

Descriptors: *Desalination, *Electrodes, Water purification, Electrochemistry, Calcium, Magnesium, Sulfates, Iron, Copper, *Ion exchange.
Identifiers: *Ion selective electrodes, Nonoride glasses, *Sensors (Electrochemical).

Ion-selective electrochemical sensors can provide a means for rapidly determining and continuously monitoring the concentration of a variety of ionic species in aqueous solutions, particularly saline

and brackish waters. The development of novel ion-selective sensors was the goal of this research program. Specifically, the program goal was to develop inexpensive, chemically durable, and highly selective electrochemical sensors which would provide rapid and specific response to Fe+3, Cu+2, Ca+2, Mg+2, Na+, K+, and SO±4 in saline and brackish water. The primary approach was to investigate the use of nonoxide materials, both crystalline and amorphous, which, when fabricated into sensors, gave selective response to the specific ions of interest. The research program had four major parts: sensor material preparation; material characterization, including resistivity; sensor preparation and evaluation for ion selectivity; and sensor mechanism studies. (OSW)
W74-00146

METHODS FOR CONTROLLING MARINE FOULING IN INTAKE SYSTEMS,
Dow Chemical Co., Freeport, Tex.
D. C. Mangum, B. P. Sheperd, and W. F. McIlhenny.
Available from National Technical Information Service as PB-221 909, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 858, June 1973. 124 p, 32 fig, 18 tab, 32 ref. 14-30-2829.

Descriptors: *Desalination, *Intakes, Intake structures, *Fouling, Economics, Heated water, Corrosion, Water quality control, *Chlorine.
Identifiers: *Intake systems, Chlorine control, Copper allow liners.

Principal marine fouling organisms along the Pacific, Atlantic, and Gulf Coasts of the United States have been identified. Various control methods have been experimentally evaluated on sea water. Control of fouling must be considered at all phases of desalting plant design, construction, and operation. Chlorine is the toxin of choice for most sea water intake systems. (OSW)
W74-00148

MUNICIPAL DESALTING STUDIES FOR SELECTED KANSAS COMMUNITIES,
Wilson and Co., Salina, Kans.
For primary bibliographic entry see Field 05F.
W74-00156

IMPROVED ETHYL CELLULOSE MEMBRANES FOR REVERSE OSMOSIS APPLICATION,
Gulf South Research Inst., New Orleans, La.
J. K. Smith, and E. Klein.
Available from the National Technical Information Service as PB-222 288, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 863, January 1973. 35 p, 5 fig, 12 tab, 12 reg.

Descriptors: *Membranes, *Reverse osmosis, *Semipermeable membranes, *Permselective membranes, Permeability, *Desalination, Films, Mass transfer, Brackish water, *Polymers.
Identifiers: Ethyl cellulose membranes, Solubility parameters, Asymmetric membranes, Membrane casting variables, Tubular ethyl cellulose membranes.

Ethyl cellulose, a very chemically stable polymer has been studied for the formation of asymmetric membranes for reverse osmosis. A solution prediction model has been developed which allows the formation of asymmetric membranes from a larger number of solvent combinations. The data from both flat sheet and tubular asymmetric ethyl cellulose membranes reveal an outstanding stability to alkaline solutions, good rejections for most solutes but relatively low flux. The compaction of these membranes is of the same degree as cellulose acetate. (OSW)
W74-00157

NEW MEMBRANE COMPOSITIONS FOR DESALINATION OF WATER BY REVERSE OSMOSIS,
Monsanto Research Corp., Dayton, Ohio.
P. H. Wilken, A. J. Blardinelli, J. L. Schwendeman, I. O. Salyer, and L. E. Erbaugh.
Available from the National Technical Information Service as PB-220 145, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 862, November 1972. 40 p, 2 fig, 12 tab.

Descriptors: *Membranes, *Reverse osmosis, *Permselective membranes, *Permeability, *Semipermeable membranes, *Desalination, Films, Membrane processes, Pressure, Separation techniques.
Identifiers: Ethylene/vinyl acetate copolymers, Vinyl alcohol/vinyl acetate copolymers, Acrylonitrile copolymers, Polyblends, Compression molding, Solution casting.

Dense membranes of acrylonitrile/methylvinylpyridine (50/50) compositions had excellent handling and processing characteristics and rejected 73% of sodium chloride from a 35,000 ppm feed stock at 1200 psig, at a flux of 0.23 gfd. Although the salt rejection is lower, the flux is more than double that of comparable membranes of cellulose acetate (95%, 0.1 gfd). 'Asymmetric' membranes prepared from 15% solutions of acrylonitrile/methylvinylpyridine copolymer in dimethylacetamide/glycerine (85/15) wer prepared. Coagulated membranes gave 80% rejection of sodium chloride (3.5%) at a flux of 1.6 gfd. In the vinyl acetate polymers and copolymers, the best salt rejection and flux was obtained in vinyl acetate/vinyl alcohol copolymers containing from 10 to 25% vinyl alcohol. Thin dense membranes in this range of vinyl alcohol content rejected 84% of sodium chloride (3.5%) at a flux of 0.1 gfd. (OSW)
W74-00158

DEVELOPMENT OF IMPROVED MEMBRANES FOR REVERSE OSMOSIS,
Hercules, Inc., Cumberland, Md. Allegany Ballistics Lab.
R. V. Cartwright, M. A. Grable, and B. M. Ruggleman.
Available from the National Technical Information Service as PB-221 699, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 857, May 1973. 86 p, 5 fig, 14 tab, 18 ref. Contract 14-30-3011.

Descriptors: *Desalination, *Membrane processes, *Reverse osmosis, *Gels, *Polymers, *Permeability.
Identifiers: Crosslinking, Ultra-thin membranes, Polyethers, Cellulose ethers, Butadiene, Vinyl pyridine, Salt rejection.

The goal was to develop a new polymer for single-stage seawater conversion, that castable, high in performance and resistant to hydrolytic degradation. To this end, an investigation was made into three classes of hydrophilic polymers shown earlier to have promise for use in reverse osmosis membranes. The polymers, which include cellulosics, vinyl copolymers, and polyethers, were modified to effect water insolubility and to form structures which contained a high porportion of Lewis base functionality. Films of these materials were evaluated for water and salt permeability and performance in reverse osmosis. (OSW)
W74-00159

EVALUATION OF ASYMMETRIC HOLLOW FIBERS FOR DESALINATION BY REVERSE OSMOSIS,
Amicon Corp., Lexington, Mass.
D. S. Cleveland, M. Rambeau, A. Czernicki, and T. R. Rich.
Available from the National Technical Information Service as PB-221 654, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 856, April 1973. 34 p, 4 fig, 4 tab, 1 ref. 14-30-3010.

Descriptors: *Desalination, *Reverse osmosis, Cellulose, *Membranes.
Identifiers: *Cellulose acetate, *Hollow fibers, Nomex, Polyacrylic acid, Polysulfone, Tubules, Burst pressure, Composite membranes, Spinnerette.

Asymmetric hollow fiber membranes with the discriminating skin on the inside of the fiber were prepared from aromatic polyamides (Nomex) and cellulose acetate. These fibers have an inside diameter of 0.018 in. and a wall thickness ranging from 0.002 in. to 0.007 in. Nomex fibers gave water flux rates of 20 GSFD at 40% magnesium sulfate and 20% sodium chloride rejection levels when tested with a 1500 ppm brackish feed brine. The burst pressure of these fibers averaged 150 psig. Initial attempts at producing cellulose acetate fibers resulted in fibers which exhibited very poor burst strength, less than 25 psig in most cases, and no NaCl rejection with very low salt concentrations. A secondary product of the project was a single fiber testing device which allowed screening of candidate fibers immediately after spinning, without having to wait for a module to be potted. (OSW)
W74-00160

HYDROCASTING REVERSE OSMOSIS MEMBRANES, DEVELOPMENT OF POROUS SUPPORT TUBES, STUDY OF MECHANISM OF MEMBRANE FORMATION AND DEVELOPMENT OF NON-CELLULOSIC DESALINATION MEMBRANES,
Hydronautics, Inc. Laurel, Md.
M. Frommer, A. Gollan, R. Matz, and M. Tulin.
Available from the National Technical Information Service as PB-221-604, $1.45 in microfiche. Office of Saline Water Research and Development Program Report No. 855, January 1973. 154 p, 50 fig, 22 tab, 42 ref. 14-30-2974.

Descriptors: *Desalination, *Reverse Osmosis, Cellulose, *Porosity, *Membranes, *Surface tension, *Osmosis, *Permeability.
Identifiers: Cellulose acetate, Hydrocasting, Skinned Membranes, Asymmetric Membranes, Porous support tubes, Tubules.

Section titles include: Hydrocasting cellulose acetate membranes in porous support tubes and porous tubes development; Characterization of cellulosic and non cellulosic membrane tubules hydrocast in solid tubes; RADII optimization of internally skinned membrane tubules; The mechanism of membrane formation VI: convective flows and large void formation during membrane precipitation; The structure of cellulose acetate membranes the surface tension of polymer solutions; and Preliminary production cost estimate of supported and unsupported hydrocast modules. (OSW)
W74-00161

REACTIONS AND TRANSPORT PHENOMENA, AT SURFACES,
Oak Ridge National Lab., Tenn.
F. A. Posey, P. M. Lantz, R. E. Meyer, M. C. Banta, and A. A. Palko.
Available from the National Technical Information Service as PB-221 813, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 853, May 1973. 148 p, 59 fig, 8 tab, 88 ref. 14-01-0001-937.

Descriptors: Electrochemistry, *Electrodes, *Instrumentation, Corrosion, Oxygen, Sea water, *Desalination, *Surfaces.
Identifiers: *Transport phenomena (Surfaces), *Voltammetry, Electroanalysis, Suspension electrodes, Metal pitting, Silver-silver chloride electrodes, Oxygen analysis, Bicarbonate removal, pH-control.

This report is composed of nine papers: An approximate mass-transport Model for Pitting of Metals; Chronopotentiometry and Voltammetry of the Ag-AgCl Electrode in Flowing Streams, I. Experimental; Chronopotentiometry and Voltammetry of the Ag-AgCl Electrode in Flowing Streams, II. Theoretical; Rapid Batch and Continuous Electroanalysis for the Chloride Ion; Chronopotentiometry of the Silver-Silver Sulfide System; An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level; Properties of the Suspension Electrode; Theory of the Suspension Electrode; and Development of a Device for Pretreatment of Seawater for pH Control and Bicarbonate Removal. (OSW)
W74-00162

TRANSPORT PROPERTIES OF CHARGE-MOSAIC MEMBRANES-PART A,
Harvard Medical School, Boston, Mass.
J. N. Weinstein, C. R. Gardner, and S. R. Caplan.
Available from the National Technical Information Service as PB-223 153, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 864, (October 1972). 48 p, 9 fig, 3 tab. 14-01-0001-2148.

Descriptors: *Membranes, *Ion transport, Osmosis, *Permeability, *Permselective membranes, Semipermeable membranes, *Desalination, Films, Thin films, Membrane processes, Pressure, Separation techniques.
Identifiers: Piezodialysis, Pressure dialysis, Nonequilibrium thermodynamic analysis, *Charge mosaic membranes, Polarization, Hydrodynamic model, Phenomenological coefficients, Concentration polarization.

A nonequilibrium thermodynamic analysis of piezodialysis is presented. For a charge-mosaic membrane in which circulating current constitutes the major contribution to salt flow, it is shown that the 'complete' local phenomenological coefficients are concentration-independent. Hence, upon integration, the flows may be expressed as linear functions of the global forces. The resulting expressions are used to predict the fractional recovery and rate of production of potable water in desalination by piezodialysis. An illustrative calculation is performed for a cylindrical tube (or hollow fiber) made from a hypothetical mosaic membrane whose properties have been calculated from those of Zeo-karb 315 cation exchange membrane. Perfect radial mixing and the absence of concentration polarization are assumed in order to focus attention on the role played by the membrane elements and circulating currents. For a 1 mm thick membrane the calculation shows an 81% recovery of potable water of 350 ppm from a brackish water feed of 1500 ppm, the rate of production being 23 gpd/sq ft. A thinner mosaic with a correspondingly reduced pattern size would give a proportionately higher production rate with no loss in recovery, provided that significant polarization could be prevented. This calculation sets upper limits on the performance of a given membrane by assuming that its properties, rather than the hydrodynamic conditions, are rate controlling. The analysis suggests ways of changing membrane properties to improve performance. (See also W74-00311) (OSW)
W74-00310

TRANSPORT PROPERTIES OF CHARGE-MOSAIC MEMBRANES - PART B,
Harvard Medical School, Boston, Mass.
J. N. Weinstein, B. J. Bunow, and S. R. Caplan.
Available from the National Technical Information Service as PB-223 153, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 864, (October 1972). 103 p, 19 fig, 8 tab. 14-01-0001-2148.

Descriptors: Membranes, *Ion transport, Osmosis, *Reverse osmosis, *Membrane processes, *Desalination processes, Separation techniques, Pressure semipermeable membranes, Permeability, Films.

Charge-mosaic membranes are currently being considered for a number of practical applications, most notably 'piezodialysis' desalination. In Part I of this series the properties of the charge-mosaic are subjected to a nonequilibrium thermodynamic analysis, with emphasis on the role of the electrical resistance in the solutions bathing the membrane. Four regimes of operation are delineated by the analysis: (i) membrane control, (ii) solution control, (iii) co-ion leakage control, and (iv) polarization control. The nonequilibrium thermodynamic analysis developed in Part I of this series was subjected to experimental test. Experiments were performed to evaluate a set of six independent transport coefficients characterizing the individual anion and cation exchange elements. The results were used in conjunction with calculated values of the solution conductances to predict the transport properties of the charge-mosaic as a whole. (See also W74-00310) (OSW)
W74-00311

NEW POLYMER MEMBRANE TECHNOLOGY FOR DESALINATION OF SEAWATER BY REVERSE OSMOSIS,
Union Carbide Corp., Bound Brook, N.J.
L. A. Pilato, L. M. Litz, J. E. McGrath, R. N. Johnson, and I. E. Kochevar.
Available from the National Technical Information Service as PB-222 996, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 867, March 1973. 40 p, 1 fig, 16 tab. 14-30-2985.

Descriptors: *Reverse osmosis, *Membranes, *Desalination, *Permselective membranes, Seawater, Saline water, Demineralization, Semipermeable membranes, Absorption, Pressure.
Identifiers: Hydrophilic heterocyclic monomers, Polysulfone, Poly (aryl ethers), Ethoxylation of Nylon 6, Water sorption.

The modification of poly (aryl ethers) by incorporation of heterocyclic hydrophilic monomers or amide containing monomers has improved their water uptake to values of 3-5% when compared to 0.69% for polysulfone, an unmodified poly (aryl ether). Attempts to increase the water sorption of the novel amide containing poly (aryl ethers) by ethoxylation were unsuccessful. Low water fluxes 1 x 0.0001 gal/sq ft-day (GFD) under reverse osmosis conditions (0.1% NaCl at 1500 psi) were generally observed for all novel poly (aryl ethers). Model studies designed to improve the reverse osmosis behavior of polyamides were conducted with nylon 6. Ethoxylated nylon 6's with ethylene oxide contents ranging from 1.4 - 6.5% afforded fluxes ranging from 0.3 - 1.7 gal/sq ft-day (GFD) and salt rejections ranging from 44-90%. Characterization of these systems indicated that polymer crystallinity decreased with increasing ethylene oxide content. Ethoxylation of Trogamid T, an amorphous alkyl polyamide, to levels up to 6% ethylene oxide afforded materials with low water flux. Ethoxylation of an aryl polyamide significantly increased water flux, but decreased salt rejection. (OSW)
W74-00312

FABRICATION AND TESTING OF TUBULAR REVERSE OSMOSIS MODULES CONTAINING ULTRATHIN MEMBRANES FOR WET-DRY CYCLING OPERATIONS,
North Star Research and Development Inst., Minneapolis, Minn.
For primary bibliographic entry see Field 05F.
W74-00313

DEVELOPMENT OF HIGH-FLUX HOLLOW REVERSE OSMOSIS FIBERS FOR BRACKISH WATER SOFTENING,
Monsanto Research Corp., Durham, N.C.
R. L. Leonard.
Available from the National Technical Information Service as PB-223 102, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 872, September 1973. 52 p, 8 fig, 21 tab, 4 ref. 14-30-3066.

Descriptors: *Membrane processes, *Desalinationprocesses, Desalination, *Reverse osmosis, *Water treatment, *Water softening, Pilot plants, Brackish water.
Identifiers: Hollow fine fiber modules, Cellulose acetate membranes.

This study involved additional development of asymmetric cellulose acetate hollow fibers and resulted in a brackish water desalting system for hardness removal and partial demineralization exhibiting fluxes of 8.5 gfd at 100 psig operating pressure. The fiber systems tested showed good stability with flux declines of less than one percent after 100 days of continuous operation. Two modules, an axial-flow and radial-flow unit, each in excess of 5000 gpd capacity were assembled and field tested on Webster, So. Dakota feedwater. The radial design unit, a six-inch diameter module with four-foot active length, produced 6000 gpd (70 deg F) with salt rejection of 92%, at 100 psig operating pressure. Design and construction work was also carried out on a third modular concept, the fiber bobbin cartridge, but this was not carried through to evaluation of a functional unit. (OSW)
W74-00314

RESEARCH ON COMPOSITE HOLLOW TUBULES,
DeBell and Richardson, Inc., Enfield, Conn.
B. Baum, R. A. White, H. Stiskin, and W. H. Holley, Jr.
Available from the National Technical Information Service as PB-222 977, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 865, March 1972. 88 p, 14 fig, 27 tab, 10 ref. 14-30-2784.

Descriptors: *Reverse osmosis, *Membranes, *Desalination, *Permselective membranes, Brackish water, Pressure, Semipermeable membranes, Permeability, Coatings.
Identifiers: *Polyvinyl chloride tubules, Porous supports, Asymmetric cellulose acetate, Ultrathin film barriers, Dynamically formed membranes, Polyacrylic acid membranes, Polyvinyl chloride films, Ultrathin polyethyleneimine/toluene diisocyanate films.

The work has consisted of preparing porous tubules, 0.030-0.060 inch diameter, and coating the outside of the tubules with reverse osmosis permselective barriers. Asymmetric cellulose acetate E-400-25 dissolved in formamide-acetone is the most promising coating, yielding very consistent results even when handled roughly. Initial results with this system were low in flux but this problem was solved by using more dilute cellulose acetate casting solutions. Tubulet fluxes of 14 to 15 gf2d at 800 psi and 1% NaCl were readily attainable. Salt rejections were 95-98%. Initial work with the dynamically formed membranes from zirconium oxide and polyacrylic acid showed promise (6-18 gf2d at 94 to 98% sodium sulfate rejection and 80-94% sodium chloride rejection at 950 psi). Preliminary work was carried out to develop a polysulfonic-zirconium oxide membrane which should be more resistant to fouling by divalent ions. Initial membranes gave low salt rejections (80%) but the system deserves further investigation. These dynamically formed systems have the advantage of in situ coating of the tubulets in the module. Work with ultrathin cellulose acetate, sulfonated PPO, polyethyleneimine-TDI, and polyacrylic acid coated directly on the porous tubulet with and

without pore fillers gave only 0-40% rejection. Apparently the pore size is too large. A finer (0.05 micro) pore PVC formulation was developed but the fine pore uncoated PVC did not permit water flux at pressures much below 800 psi. (OSW)
W74-00315

RESEARCH ON REVERSE OSMOSIS MEMBRANES FOR PURIFICATION OF WASH WATER AT STERILIZATION (165 DEG F),
General Electric Co., Lynn, Mass.
For primary bibliographic entry see Field 05D.
W74-00316

RESEARCH ON COMPOSITE HOLLOW TUBULETS,
DeBell and Richardson, Inc., Enfield, Conn.
B. Baum, R. A. White, W. H. Holley, Jr., and H. Stiskin.
Available from the National Technical Information Service as PB-222 978, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 868, March 1973. 86 p, 16 fig, 32 tab, 5 ref. 14-30-2784.

Descriptors: *Reverse osmosis, *Membranes, *Permselective membranes, *Semipermeable membranes, *Desalination apparatus, Filtration, Plastics, Thin films, Pressure, Desalination.
Identifiers: *Porous PVC Tubulets, Cellulose acetate coating, Tubulet bundles.

Formulation and methods for preparing porous 0.027 inch OD tubulets at extrusion rates of 200 feet/minute were perfected. Methods for coating long lengths of tubulet with uniform flaw-free asymmetric cellulose diacetate were developed. A bundle permeator was assembled and potted. The permeator characteristics with 515 psi, 0.5% NaCl are Flux - 15.9 gal/day, 10 gft2d, Salt Rejection - 95.8%, Flux/volume - 10,970 gal/day/cu. ft. Work with coating systems other than asymmetric cellulose diacetate was carried out but these alternate systems were not developed as far as would be needed to prepare a bundle permeator. (OSW)
W74-00317

RESEARCH ON ADVANCED MEMBRANES FOR REVERSE OSMOSIS,
Envirogenics Co., El Monte, Calif.
A. F. Graefe, W. J. Schell, C. W. Saltonstall, Jr., V. T. Stannett, and H. B. Hopfenberg.
Available from the National Technical Information Service as PB-223 008, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 870, March 1973. 55 p, 15 fig, 14 tab, 16 ref. 14-30-2999.

Descriptors: *Reverse osmosis, *Membranes, *Semipermeable membranes, Sea water, Permselective membranes, Semipermeable membranes, Permeability, *Desalination.
Identifiers: Polysulfone, Sulfonated polysulfones, Composite membranes, Asymmetric membranes, Polyoxetanes.

One of the objectives was that of preparing new noncellulosic polymers for asymmetric membrane fabrication that exhibit intrinsic chemical and reverse-osmosis transport properties superior to those of cellulose acetate. Those polymers containing ether and sulfone groups appeared to be the most promising; accordingly, attention was directed to the evaluation of modified polysulfones and polyoxetanes. With respect to asymmetric membranes it was found that sulfonation of Bakelite polysulfone (Union Carbide, P1700) yielded a product possessing intrinsic osmotic properties superior to those of cellulose acetate. Dense films of sulfonated polysulfone exhibited rejections of 35,000 ppm sodium chloride as high as 99.6% at 1500 psig. The development of asymmetric membranes from sulfonated polysulfone resulted in sodium chloride rejections greater than 91% with a flux of 27.5 gfd at 400 psig. Fluxes as high as 66 gfd were achieved with sodium sulfate at 400 psig with a rejection of 95.6%. Studies of composite membranes found that poly (2-methyl-5-vinyl) pyridine deposited on tubular polysulfone support membranes exhibited greater than 30 gfd flux and and 40% rejection with 1000 ppm magnesium sulfate at 400 psig. An investigation was made relating to the modification of Penton, in film form, through the radiation grafting of selected hydrophilic monomers. Successful grafting was achieved with styrene, methyl methacrylate, and 2-vinyl pyridine. (OSW)
W74-00318

DESIGN INTEGRITY AND PERFORMANCE CHARACTERISTICS OF HELICAL TUBULAR MODULE ELEMENTS IN REVERSE OSMOSIS PLANTS,
Philco-Ford Corp., Newport Beach, Calif.
R. H. Williams, G. Segovia, W. H. Bachle, J. C. Britt, and J. L. Richardson.
Available from the National Technical Information Service as PB-223 119, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 871, September 1973. 83 p, 28 fig, 17 tab, 4 ref. 14-30-2740.

Descriptors: *Desalination, Desalination processes, *Reverse osmosis, *Membrane processes, *Pilot plants, Brackish water.
Identifiers: Helical tubular module elements, Field evaluation testing.

A brackish water desalting reverse osmosis pilot plant incorporating 36 series-connected helical tubular segments, each formed from a one inch diameter, 50 foot long tubular membrane was designed and fabricated. The membrane permselectivity was varied from the system inlet to outlet in a predetermined manner in order to enhance overall system performance. Individual membrane segments were subjected to laboratory tests with 5000 ppm NaCl and 2000 ppm Na2SO4 test solutions to establish (a) effects of inlet pressure, temperature and velocity on performance; (b) membrane compaction rates, burst pressures, and frictional pressure drop; and (c) effects of negative pressures and pressure cycling. The assembled pilot plant was tested in the laboratory to verify design integrity and performance at various operating pressures, fractional recoveries and feedwater velocities. Subsequently, the pilot plant was installed and operated at the OSW Brackish Water Test Facility at Roswell, New Mexico. A sixty day qualification test period was successfully completed on July 6, 1972. (OSW)
W74-00319

DEFINITION OF REVERSE OSMOSIS REQUIREMENTS FOR SPACECRAFT WASH WATER RECYCLING,
McDonnell Douglas Astronautics Co.-West, Huntington Beach, Calif.
For primary bibliographic entry see Field 05D.
W74-00320

HYGIENIC EVALUATION OF THE QUALITY OF WATER OBTAINED BY MEANS OF ELECTRODIALYSIS DESALTING OF IMITATION SEA WATER, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
A. F. Aksyuk, Yu. V. Novikov, Z. A. Anisimova, T. K. Parkhomchuk, and E. F. Gorshkova.
Gig Sanit. Vol 37, No 4, p 19-23. 1972. Illus. (English summary).
Identifiers: *Electro dialysis, *Hygienic aspects, Imitation, Rat, Water quality, Sea water, *Desalination.

Complex hygienic investigations showed that water desalted using electrodialysis without special treatment caused changes of the mineral metabolism in organs and tissues, disturbances in nervous system activity and pathohistological lesions of internal organs in albino rats.--Copyright 1973, Biological Abstracts, Inc.
W74-00478

3B. Water Yield Improvement

RULES, REGULATIONS AND MODES OF PROCEDURE, RELATING TO THE TEXAS WEATHER MODIFICATION ACT, V.A.T.S. WATER CODE, CHAPTER 14.
Texas Water Development Board, Austin.

Report, April 1973. 33 p.

Descriptors: *Weather modification, *Legal aspects, *Texas, Permits, Regulation, State governments, Legal review, Water law, Penalties (Legal), Adjudication procedure, Administrative agencies, Decision making.
Identifiers: Hearing panel.

Rules, regulations and modes of procedure relating to the Texas Weather Modification Act, V.A.T.S. Water Code, Chapter 14, as amended March 20, 1973, are presented. The rules are adopted for the purpose of promoting continued research and development in the science and technology of weather modification, minimizing the danger of weather modification activities to health and property, simplifying procedures, avoiding delays, saving expenses, and facilitating administration and enforcement of Chapter 14 (Weather Modification) of the Texas Water Code, and these rules shall be constructed accordingly. (Woodard-USGS)
W74-00357

EVAPORATION RETARDATION BY MONOMOLECULAR LAYERS,
Delaware Univ., Newark. Dept. of Mechanical and Aerospace Engineering.
Y. S. Lou, and G. P. Rasmussen.
Water Resources Research, Vol 9, No 5, p 1258-1263, October 1973. 2 fig, 14 ref.

Descriptors: *Evaporation control, *Monomolecular films, *Reservoir evaporation, Mathematical studies, Mass transfer, Diffusion, Water temperature.

An analytical theory based on the kinetic theory of discrete particles describes the movement of water molecules through a monolayer. A simplified model based on the theory shows the rate of evaporation through a monolayer to be a function of the length of the hydrocarbon chain molecules, the arrangement of the monolayer molecules, the thickness of the surface diffusion sublayer, and the temperature of the water. (Knapp-USGS)
W74-00373

3C. Use of Water of Impaired Quality

SALINITY STUDIES IN EAST GLADES AGRICULTURAL AREA, SOUTHEASTERN DADA COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. E. Hull, and F. W. Meyer.
Open-file Report 73005, 1973. 84 p, 20 fig, 2 tab, 18 ref.

Descriptors: *Salinity, *Surface waters, *Groundwater, *Florida, Agriculture, Hydrologic data, Land use, Groundwater movement, Water levels, Saline water intrustion, Topography, Streams, Canals, Soils, Saline soils, Water analysis, Chemical analysis, Aquifer characteristics, Chlorides, Data collections, Forecasting.
Identifiers: *Dade County (Fla.).

Investigations were made in southeastern Dada County, Florida, to determine the source of salts in the soil and the process by which the salts accumulate. Saline soils in the East Glades agricultural area are caused chiefly by brackish groundwater moving upward from the water table during dry periods. Brackish groundwater is caused by infiltration of saltwater from nearby coast-normal canals and by inland movement of saltwater through the deep parts of the Biscayne aquifer during droughts. The soils most prone to salt accumulation generally occur within the area affected by sea-water intrusion. The outlook for the East Glades is for no improvement in saline soil problems unless land use changes permit higher water levels along the coast to halt the inland movement of seawater. (Woodard-USGS)
W74-00329

CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS,
Texas A and M Univ., College Station.
D. L. Reddell, P. J. Lyerly, and J. J. Hefner.
Paper No 72-960 presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972. 14 p, 2 fig, 7 tab, 9 ref.

Descriptors: Application methods, *Cultivation, *Crop yield, Nitrates, Forage, Salinity, *Farm wastes, Cattle, *Waste disposal, Texas, Ground water, Irrigation, Aquifer, *Fertilizers, Moisture content, Nutrients.

The objectives were to evaluate the pollution and crop growth due to deep plowing large amounts of beef manure. Two problems faced by feed lot operators have been finding sufficient land on which to use large quantities of feed lot waste and contending with the excessive salinity of such waste. Three locations with Hoban silty clay loam, and Vinton fine sandy loam were used and graduated amounts of waste up to 900 tons per acre were applied at depths of 14 to 36 inches. Rates of application and nitrate contents of crops yielded are recorded. Results show peak yield and nitrate composition of crops to be on those acres with 25 and 50 tons of farm waste. In all locations acres with 900 tons per acre yielded more than the check plot (0 tons per acre). Those most heavily laden plots presented no major surface water pollution problem. (Frantz-East Central)
W74-00425

EFFECTS OF SWINE LAGOON EFFLUENT ON THE SOIL AND PLANT TISSUE,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00428

3D. Conservation in Domestic and Municipal Use

METHODOLOGY FOR ASSESSING THE POTENTIAL IMPACT OF URBAN DEVELOPMENT ON URBAN RUNOFF AND THE RELATIVE EFFICIENCY OF RUNOFF CONTROL ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 02A.
W74-00001

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCES SYSTEMS, VOL. VI ESTIMATING ECONOMIES OF SCALE IN THERMAL ELECTRIC POWER SYSTEMS SUBJECTED TO ENVIRONMENTAL QUALITY CONSTRAINTS,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-00002

INTERACTION OF BULK PRECIPITATION, STREAM WATER, AND SEWAGE IN A SMALL WATERSHED NEAR OXFORD, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 02A.
W74-00005

WATER USE--COMMITTEE REPORT, PART II, REVIEW OF THE JOHNS HOPKINS UNIVERSITY RESEARCH PROJECT METHOD FOR ESTIMATING RESIDENTIAL WATER USE.
American Water Works Association, New York. Committee on Water Use.
For primary bibliographic entry see Field 06D.
W74-00121

ENGINEERING ALTERNATIVES IN NATURAL RESOURCES DEVELOPMENT IN URBAN REGIONS,
Philadelphia Water Dept., Pa.
For primary bibliographic entry see Field 05D.
W74-00122

ROLE OF DIGITAL COMPUTER MODELS OF AQUIFERS IN WATER RESOURCES PLANNING: CASE STUDY IN TUCSON, ARIZONA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 04B.
W74-00176

RELIABILITY OF URBAN WATER QUALITY MANAGEMENT,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05G.
W74-00180

NEED FOR METROPOLITAN WATER BALANCE INVENTORIES,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Program.
For primary bibliographic entry see Field 06A.
W74-00187

ECONOMIC ANALYSIS AND MUNICIPAL WATER SUPPLY IN DEVELOPING COUNTRIES,
International Bank for Reconstruction and Development, Washington, D.C.
For primary bibliographic entry see Field 10A.
W74-00190

TOXIC MATERIALS ANALYSIS OF STREET SURFACE CONTAMINANTS,
URS Research Co., San Mateo, Calif.
For primary bibliographic entry see Field 05B.
W74-00306

GROUND WATER RECHARGE, SOUTHERN REGIONAL DISTRICT, MONTGOMERY COUNTY, OHIO, ENGINEERING STUDY AND REPORT, PHASE I.
Moulenbelt and Seifert, Dayton, Ohio.
For primary bibliographic entry see Field 04B.
W74-00439

REPORT TO THE GOVERNOR AND THE INTERIM FINANCE COMMITTEE: ALTERNATIVE RECOMMENDATION, LAS VEGAS WASH/BAY POLLUTION ABATEMENT PROJECT.
Clark County Board of County Comissioners, Nev.
For primary bibliographic entry see Field 05D.
W74-00440

FROM RESORT AREA TO URBAN RECREATION CENTER: THEMES IN THE DEVELOPMENT OF LAKE TAHOE 1946-1956,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 06B.
W74-00441

DEMOGRAPHIC EFFECTS OF WATER DEVELOPMENT,
For primary bibliographic entry see Field 06D.
W74-00443

WATER DEVELOPMENT AND URBAN RECREATION,
For primary bibliographic entry see Field 06B.
W74-00446

SOLID WASTE MANAGEMENT.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 05G.
W74-00449

METROPOLITAN COUNCIL FIVE-YEAR CAPITAL IMPROVEMENT PROGRAM FOR SEWERAGE FACILITIES.
Metropolitan Council of the Twin Cities Areas, Minn.
For primary bibliographic entry see Field 05G.
W74-00450

METROPOLITAN DEVELOPMENT GUIDE, WATER RESOURCES POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 06B.
W74-00451

SEWAGE AND WASTE CONTROL RULES AND REGULATIONS FOR THE METROPOLITAN DISPOSAL SYSTEM.
Metropolitan Sewer Board, St. Paul, Minn.
For primary bibliographic entry see Field 05G.
W74-00452

COMPREHENSIVE PLAN FOR BATON ROUGE.
Baton Rouge City-Parish Planning Commission, La.

June, 1972. 113 p, 5 fig, photos, 20 maps, 21 tab.

Descriptors: *Comprehensive planning, *Land use, *Flood plains, *Louisiana, Urbanization, Drainage, Environmental effects, Flood plain zoning, Canals, Sewerage, Projections, Implementation, *Cities.
Identifiers: *Land use plan, Flood plain management, *Baton Rouge, Utility extension policies.

The purpose is to help guide urban development in East Baton Rouge Parish where the present population of 300,000 is expected to reach 425,000 during the planning period of 15 to 20 years. The emphasis is on relating urban land uses to various determinants such as the natural environment, economic growth, social considerations, and population growth and then proposing a general land use plan as a guide for future development. Some key elements of the plan, particularly in terms of implementation are the expansion of transportation, recreation, and sewerage systems in accordance with planned priorities, the delineation and restricted use of flood plain and conservation areas, and the reformulation of zoning policies and principles. Surface water drainage is a crucial element in land use planning in Baton Rouge Parish as the annual rainfall is about 60 inches. Drainage canals are widely used to drain

residential areas and relieve flooding conditions. However, it is also necessary to deter future urban development from flood plain areas. Efforts are now being directed toward adopting a flood plain zoning regulation and other management measures. (Elfers-North Carolina)
W74-00453

NATURAL ENVIRONMENTAL ANALYSIS, NASHVILLE-DAVIDSON COUNTY, TENNESSEE.
Metropolitan Government of Nashville-Davidson County, Tenn. Planning Commission.

August, 1973. 125 p, 15 fig, photos, 11 maps, 9 tab, 61 ref.

Descriptors: *Environmental effects, *Urbanization, Slopes, Watersheds (Basins), Soils, Geology, *Tennessee, Cities.
Identifiers: *Environmental analysis, Highland Rim Escarpment, Cumberland River, J. Percy Priest Reservoir, *Nashville (Tenn.).

Components of natural environment are identified and analyzed with regard to limitations for development, and the relationship between conservation and urban development for Davidson County is explored. In discussion of the county's hydrology micro-watershed areas of the Cumberland River are identified and classified by general physical characteristics. Cheatam Reservoir (Cumberland River) and Old Hickory Dam effect flood control conservation and recreational opportunities. Old Hickory Dam also provides hydroelectric power for the general area. Construction of J. Percy Priest Reservoir in 1970 containing approximately 14,200 water acres on Stones River lowered the average elevation in the county susceptible to flooding from 420 ft. to 412 ft. above sea level. Extensive land areas around the reservoir insure high degree of water quality and environmental control. Large recreation areas are under construction. Development in flood plains is increasing. Devices to control flooding are considered. Emphasis should be placed on a balance between structural and regulatory controls. Regulations should prohibit certain uses in parts of flood plain most susceptible to flood losses. The value of the Cumberland River to provide a natural corridor through the urban area and the development of the Harpeth River and Mill Creek watersheds as urbanization increases and flood problems multiply is discussed. Ground water from 8% of county wells yield enough water for commercial, light industrial and home use. A need for new land development regulations and strategy for public and private action are expressed. (Stein-North Carolina)
W74-00455

CENTRAL FRESNO COUNTY WATER AND LIQUID WASTE PROGRAM: VOLUME I--FINDINGS, CONCLUSIONS, RECOMMENDATIONS.
Grunwald, Crawford and Associates, Inc., Fresno, Calif; and Engineering-Science, Inc., Fresno, Calif.

Prepared for Board of Supervisors, Fresno County, California. March, 1970. 127 p, 22 fig, 33 tab. append. HUD Calif. P-308.

Descriptors: *Planning, *Water supply, *Sewerage, *Groundwater, Urbanization, Water demands, Computer models, Coordination, Management, *California.
Identifiers: *Fresno County (Calif), San-Joaquin Valley Region.

This report is the first part of a five volume, comprehensive study of planning for water supply and wastewater disposal in a 410 square mile area of Fresno County, which includes Fresno, Clovis, Fowler, Kingsburg, and Selma plus adjacent agricultural lands. Basically a summary of the entire study, this volume includes short presentations on urban development patterns, projected demands for 3 periods: short-range (1975), mid-range (1985), and long-range (2015), FUTURE PROBLEMS, RECOMMENDED DEVELOPMENT PROGRAMS, FINANCING, AND INTERGOVERNMENTAL APPROACHES. Population is expected to triple by 1015. Food products manufacturing will continue to be the largest manufacturing industry in the County. Significant future shifts in the top five employment categories are projected with agricultural workers being replaced by those in the professional services, while retail trade and manufacturing remain relatively stable. Of particular interest is the Fresno Groundwater Basin, a 1,200 square mile hydrologic unit including Fresno County, and the development of a computer model to evaluate effects of future urban land use. Some of the recommendations include the consolidation of twelve local sewerage systems into two regional ones, the comprehensive management of the entire Fresno Groundwater Basin, the use of surface water in addition to the groundwater supplies, and the use of joint agreements rather than a regional agency. Numerous maps and charts supplement the text. (Elfers-North Carolina)
W74-00457

PRELIMINARY REPORT OF PUBLIC UTILITIES ANALYSIS.
Janesville Div. of Public Works, Wis.

April, 1972. 65 p, 14 fig, 11 tab.

Descriptors: *Planning, *Water supply, *Sewerage, *Drainage systems, Wells, *Wisconsin, Projections, Urbanization, Land use, Groundwater.
Identifiers: *Utility system expandion, *Janesville (Wis.), Rock River, Drainage greengelts.

The existing water supply, sanitary sewerage, and storm water disposal systems for Janesville, some of the problems involved in their operation and possible expansion, and population and land use projections requiring system expansion, several courses of action are proposed for improvement of the systems are described. The water supply system uses both deep and shallow wells and emphasis for future growth is on extension of new water lines, development of a few new well sites, and the protection of groundwater recharge northeast of the city. The sanitary sewerage system is presently adequate except for one overloaded trunk line; a relief sewer line is proposed to run parallel to the overloaded one. The overall system is to be expanded in accordance with urban growth control policies. The storm sewer system consists largely of natural greenbelt drainage ways which are required to be dedicated to the city by developers. This greenbelt dedication policy is encouraged to be continued along with the policy of discharging stormwater to the land rather than directly to the Rock River whenever possible. (Elfers-North Carolina)
W74-00458

3E. Conservation in Industry

GLUE TREATMENT-PICK A WAY,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05D.
W74-00165

A FUNDAMENTAL COMPARISON OF THE UTILITY OF TRICHLOROETHYLENE AND PERCHLOROETHYLENE IN THE APPLICATION OF DISPERSE DYES TO POLYESTER,
Auburn Univ., Ala. Water Resources Research Inst.
W. S. Perkins, and D. M. Hall.
In: Proceedings, Textile Solvent Technology--Update '73, Atlanta, Georgia, January 10-11, 1973. p 49-57, (1973). 13 fig, 7 tab, 10 ref, (Amer. Assoc. of Chemists and Colonists Symposium). OWRR A-020-ALA (2).

Descriptors: *Textiles, *Solvents, *Dyes, Sorption.
Identifiers: *Polyester, Trichloroethylene, Perchloroethylene, Partition coefficients.

Polyester may be rapidly dyed with selected Disperse dyes from trichloroethylene and perchloroethylene. The rate of sorption of dye by polyester is much greater from both of these solvents than from aqueous medium. Further, the rate of sorption increases greatly with increasing temperature in each solvent. A higher dyeing temperature is required to achieve as rapid rate of sorption of dye from perchloroethylene as from trichloroethylene. The equilibrium sorption of dye decreases with increasing temperature in all cases studied. Partition coefficients of each of the dyes studied are higher from perchloroethylene than from trichloroethylene. The equilibrium sorption of dye by polyester from trichloroethylene and perchloroethylene is dependent on the polarity of the dye molecule with more polar dyes in this study giving higher partition coefficients.
W74-00433

3F. Conservation in Agriculture

INTENSITY OF PLANT TRANSPIRATION IN CERTAIN VARIETIES AND MUTANT FORMS OF COTTON, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Pochvovediniya.
B. Akhmedov.
Izv Akad Nauk Tadzh SSR Otd Biol Nauk. 1. p 11-14. 1972. Illus.
Identifiers: *Cotton, Flowering, Mutant plants, *Transpiration, *USSR (Tashkent).

The water regime was studied in cotton cultivars 108-F, C-4727, 2421, and mutant No. 1 from Tashkent, mutants No. 1 and 2 obtained at the Institute of Plant Physiology and Bio-physics of the Academy of Science of the Tadzhik SSR, and a mutant from Azerbaidzhan. Mutant forms of 108-F and 2412 had more intense transpiration than the original forms during the early stages of development. In the later stages of transpiration, differences in transpiration were not observed. In all plants studied, transpiration was highest during the period of massive flowering and fruit formation. In general, transpiration increased from morning until midday, and then decreased.--Copyright 1973, Biological Abstracts, Inc.
W74-00026

RELATIONSHIP BETWEEN PROPERTIES AND AGRICULTURAL SUITABILITY OF SOILS: SOIL COMPLEXES: GOOD WHEAT SOILS, VERY GOOD RYE SOILS, GOOD RYE SOILS (IN POLISH),
Instytut Uprawy Nowozenia i Gleboznawstwa, Pulawy (Poland). Laboratorium Anal. Glebowych.
For primary bibliographic entry see Field 02G.
W74-00054

CONTRIBUTION TO THE KNOWLEDGE OF MINERAL NITROGEN DYNAMICS IN A GREY FERRUGINOUS SOIL AT NIORO-DU-RIP (SENEGAL), (IN FRENCH),
Centre National de Recherches Agronomiques de Bambey (Senegal).
D. Blondel.
Agron Trop Ser Agron Gen Etud Sci. Vol 26, No 12, p 1354-1361, 1971. Illus. English summary.
Identifiers: Fertilizers, *Minerals, *Nitrogen, *Senegal, Sorghum, *Soils (Grey ferruginous).

The dynamics of mineral N as nitrate and ammonium was studied in the field in a design of bare plots and plots under sorghum with or without nitrogenous fertilizer applications. Samples were taken every 10 cm from the surface down to 1 m deep during the 1969 rainy season (900 mm in 4 mo.). Compared with the soils at Bambey and Sefa (Senegal), the N dynamics show 2 characteristics. No mineralization peak is observed at the beginning of the rainy season and the nitrogenous fertilizer stimulates the mineralization of N in the soil.--Copyright 1973, Biological Abstracts, Inc.
W74-00062

WATER RESOURCE DEVELOPMENT PROBLEMS IN A RURAL AREA IN TRANSITION,
Montana State Univ., Bozeman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06A.
W74-00173

AGRICULTURAL WATER ALLOCATION, LAND USE, AND POLICY,
Iowa State Univ., Ames. Center for Agricultural and Rural Development.
E. O. Heady, H. C. Madsen, K. J. Nicol, and S. H. Hargrove.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY10, Proceedings paper No 10074, p 1795-1812, October 1973. 7 fig, 2 tab, 9 ref.

Descriptors: *Agriculture, *Water demand, *Linear programming, *Water allocation (Policy), *Water supply, *Forecasting, *Land use, Zoning, Hydraulics, Optimization, Water costs, Pricing, Irrigation water, Farm management, Estimating, Technology, Equations, Systems analysis, Mathematical models.
Identifiers: Federal-state cooperation, Policy, Western States.

A study is reported which used linear programming models to determine optimal water and land allocation and agricultural water needs in the year 2000 under alternative conditions of population, farm policies, exports, technology, and water prices. Fundamentally, the study represents an attempt to estimate whether there is enough water to allow the nation's future food needs to be met at reasonable actual costs by the year 2000. Since this proved possible, the amount of water needed (potential demand) in agriculture was then estimated under the several alternatives, thus also indicating the amount that could be freed from the farm sector for use elsewhere. The linear programming models used encompass U. S. agriculture in its entirety, and all of the commodities and land and water use so involved. These water demand-allocation models include variables and equations for 223 agricultural producing regions, and water resources for 51 supply regions in the 17 Western States and 27 consumer markets. The amount of water used in agriculture is partly a function of the costs of water for irrigation purposes. Thus, an auxiliary objective of the study was formulation of the models so that the demand for water under different pricing policies would be reflected (normatively). The models and results are described in detail. (Bell-Cornell)
W74-00186

THE ROLE OF THE INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE IN THE TRANSFER OF WATER RESOURCES KNOWLEDGE,
Bureau of Reclamation, Denver, Colo. Technical Services Branch.
For primary bibliographic entry see Field 10A.
W74-00199

METHODS OF TRANSFER OF WATER RESOURCES KNOWLEDGE FROM DEVELOPED TO DEVELOPING REGIONS WITH SPECIAL EMPHASIS TO ON-FARM WATER MANAGEMENT,
Agency for International Development, Washington, D.C. Office of Agriculture and Fisheries.
For primary bibliographic entry see Field 10A.
W74-00219

SOME CHARACTERISTICS OF NECTAR PRODUCTION IN THE MOUNTAIN HONEY PLANTS OF NORTHERN FERGANA (IN RUSSIAN),
Yu. S. Lynov.
Byull Mosk O-Va Ispyt Prir Otd Biol, Vol 77, No 2, p 118-124, 1972, English summary.
Identifiers: Air temperature, Altitude, *Honey plants, Moisture, Mountain plants, *Nectar, Precipitation, Seasonal, Soil, *USSR (Fergana).

The nectar productivity of N. Fergana, USSR honey plants depends on air temperature during the mesothermic season and on air temperature, and relative air humidity, soil moisture and atmospheric precipitation during the xerothermic season. The nectar productivity of honey plants increases with altitude during the xerothermic season, but decreases again at the upper limit of their range. During the mesothermic season it is higher on slopes of southern exposition.--Copyright 1973, Biological Abstracts, Inc.
W74-00235

EFFECT OF AGRICULTURAL MANAGEMENT OF WET SLOPING SOIL ON NITRATE AND PHOSPHORUS IN SURFACE AND SUBSURFACE WATER,
Agricultural Research Service, Burlington, Vt. New England Watershed Research Center.
For primary bibliographic entry see Field 05B.
W74-00371

RELATIONS BETWEEN HOST PLANTS AND PHENOLOGY OF THE GALL MIDGES CONTARINIA TRITICI (KIRBY) AND SITODIPLOSIS MOSELLANA (GEH.), (IN GERMAN),
Biologische Bundesanstalt, Kiel (West Germany). Institut fuer Getreide-, Oelfrucht-, and Futterpflanzenkr.
T. Basedow.
Z Angew Entomol. Vol 71, No 4, p 359-367. 1972. Illus. (English summary).
Identifiers: Agropyron-Repens, *Contarinia-Tritici, *Germany, Host plants, *Midges, Moisture, Oviposition, *Phenology, Plant population, Rain, Rye, *Sitodiplosis-Mosellana, Soil, Temperature, *Wheat.

The phenological differences between C. tritici and S. mosellana are shown under exact conditions in the laboratory. The existance of a 2nd generation of C. tritici could not be confirmed by investigations in the field. Temperature, rain, and soil moisture influence the course of the wheat blossom midges flights. The effect of the wheat blossom midges best known host plants, i.e., wheat, rye and couch grass (Agropyrum repens) on the population dynamics of the 2 spp. in Germany is examined. Rye is scarcely attacked by S. mosellana in wheat growing areas with a small portion of rye grown in it. But in some areas of the Weser-Ems territory, where only rye is grown, the phenology of S. mosel-lana was adapted to the early blossoming of rye, as shown by laboratory rearing. Winter wheat and spring wheat usually are attacked in the same degree by S. mosellana. Midges that emerge when wheat has finished blossoming, oviposit on wheat ears appearing very late, and on couch grass. The maximum flight of C. tritici is correlated relatively to the time of appearance of the wheat ears. Early varieties of spring wheat do not safely escape the attack by C. tritici. For this midge, too, the wheat ears appearing very late and couch grass are a reservoir of host plants.--Copyright 1973, Biological Abstracts, Inc.
W74-00388

EFFECTS OF SOME SOIL CONDITIONS ON SUGAR BEET SEEDLING EMERGENCE,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
P. C. Longden.
J Agric Sci. Vol 79, No 3, p 543-545. 1972. Illus.
Identifiers: Moisture, Range, Seedling, Soils, *Sugar beets, *Soil conditioners, *Clay soils.

Seven soil conditioners added to a sandy clay soil at Saxmundham (Suffolk, England) did not benefit sugar beet seedling emergence. In microplots at Broom's Barn free draining peat and sandy loam gave consistently more seedlings than limestone loam of flinty loam. In the laboratory, for each of 3 soil types, emergence was maximal only for a small soil moisture range and decreased rapidly when soils became drier or wetter. This suggests that conditioners which increase water-holding capacity should be tested on sandy loams rather than clay soils and that seed bed preparation on heavier soils should seek to aerate the soil.--Copyright 1973, Biological Abstracts, Inc.
W74-00389

DRAIN INSTALLATION FOR NITRATE REDUCTION,
Southwestern Irrigation Field Station, Brawley.
For primary bibliographic entry see Field 05G.
W74-00398

SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 05B.
W74-00399

HUMAN AND ANIMAL WASTES AS FERTILIZERS,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 05D.
W74-00419

SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS,
Agricultural Research Service, Davis, Calif. Agricultural Engineering Research Div.
S. R. Morrison, R. L. Givens, and G. P. Lofgreen.
Paper No. 72-423 presented at the 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972. 12 p, 1 fig, 5 tab.

Descriptors: *Cattle, *Sprinkling, Feed lots, Air conditioning, Temperature, Performance, *California.
Identifiers: *Heat stress, Respiratory rate.

Sprinkling cattle under shade during the summer in the Imperial Valley of California for one minute every 30 minutes when the temperature was above 80F resulted in significantly higher feed consumption and rate of gain, compared with cattle under shade and not sprinkled. Efficiency of feed conversion, although favoring the sprinkling operation, was not significantly improved over that of uncooled cattle. Sprinkling was as effective as a refrigerated air conditioned barn at 75F in one trial and more effective during a second trial. Sprinkling and refrigeration promoted greater comfort as indicated by the prevention of increases in respiratory rate and body temperature observed in the afternoon with control cattle. Both noncooled and cooled cattle consumed more feed and gained

more weight with 40 feet per head of space than with 20 feet. (East-Central)
W74-00421

MANURING OF POTATOES ON FEN SILT SOILS IN HOLLAND, LINCOLNSHIRE,
Agricultural Development and Advisory Service, Cambridge (England).
C. Berryman, T. Batey, T. H. Caldwell, and D. A. Boyd.
Journal of Agricultural Science, Vol 80, p 269-281, April, 1973. 1 fig, 12 tab, 17 ref.

Descriptors: Silts, *Fertilizers, *Potatoes, Nitrogen, Phosphorus, Potassium, *England, *Nutrients, Drainage, *Farm wastes, *Waste disposal, Soil profiles.
Identifiers: Tuber blackening.

Eighteen potato manurial experiments were conducted on silt soils in England between 1953 and 1963. The mean response to nitrogen in these soils was much larger than in most English soils, but responses were varied from site to site. The nitrogen was effective in increasing tuber size and yield of ware; phosphorus increased tuber numbers and decreased ware percentage. Because of the heavy potassium content of the soils tested, responses to the potassium were slight. Cooking tests showed little effect of manurial treatment on the amount or degree of tuber blackening. The recommended fertilizer nutrient requirements for light and medium silt soils are N--200 kg/ha, P2O5--130 kg/ha, and K2O--190 kg/ha. The same nutrient recommendations for the heavy silt soils were 200 kg/ha, 310 kg/ha, and 100 kg/ha respectively. (Frantz-East Central)
W74-00422

AGRICULTURE AND ENVIRONMENT,
For primary bibliographic entry see Field 05B.
W74-00427

THE TRANSPIRATION OF CORN,
Baghdad Univ. (Iraq). Coll. of Agriculture.
For primary bibliographic entry see Field 02D.
W74-00467

WATER REQUIREMENTS OF WHEAT (TRITICUM AESTIVUM L.) FROM METEOROLOGICAL PARAMETERS,
Meteorological Service of Canada, Toronto (Ontario).
B. Padmanabhamurty, and S. K. Dasgupta.
Indian J Agric Sci. Vol 42, No 3, p 223-226. 1972. Illus.
Identifiers: Air temperature, Equations, *Evapotranspiration, Meteorological parameters, Relative humidity, Sunshine, Temperature, Transpiration, Triticum-Aestivum, *Wheat, Wind speed, *Water requirements.

Evapotranspiration from wheat crop was estimated from air temperature, wind speed sunshine duration and relative humidity. An equation was developed for the climatic conditions obtained at Poona, India. The equation was derived from 1962-63 data and was tested by applying it to the observed data for 1954-55 and 1957-58 from a wheat crop. Within the limits of accuracy of observation, the estimated values are closely related to observed values.--Copyright 1973, Biological Abstracts, Inc.
W74-00468

EFFECT OF IRRIGATION AND FERTILIZER LEVELS ON THE YIELD AND QUALITY OF GROUNDNUT,
Haryana Agricultural Univ., Hissar (India).
B. P. Singh, Kanwar Singh, and T. P. Yadava.
Haryana Agric Univ J Res. Vol 1, No 2, p 11-14. 1971.
Identifiers: *Fertilizers, *Groundnut, *Irrigation, Crop yield.

During the first year I2 treatment (1 irrigation at flowering + 1 irrigation at pod formation) gave significantly higher pod yield than control and I1 treatment (irrigated at flowering stage). On an average, the increase due to 2 irrigations (I2) was 417 kg/ha over the control and 381 kg/ha pods over that obtained with I1. The application of 15, 30 and 60 kg P2O5/ha gave 93,154 and 169 kg increase in pod yield/ha. The shelling percentage and oil content were not affected significantly by any of the treatments.--Copyright 1973, Biological Abstracts, Inc.
W74-00469

EFFECT OF SOIL DROUGHT ON WATER AVAILABILITY AND PLANT GROWTH, (IN RUSSIAN),
Moscow State Univ. (USSR).
N. A. Muromtsev.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 2, p 83-88. 1972. Illus. (English summary).
Identifiers: Drought, Growth (Plants), *Soil drought, Water availability, Crop yield, *Oats, Soil moisture.

As a result of periodic soil droughts, oat harvest considerably decreased, but drought resistance of the plants increased. The soil moisture wilting % for oats which had not been exposed to droughts, was 1.5-2.0% higher than that for plants, which had been exposed to droughts.--Copyright 1972, Biological Abstracts, Inc.
W74-00475

THE INFLUENCE OF MANURE AMELIORATION TREATMENTS ON PHYSICAL PROPERTIES OF SANDY SOIL, (IN POLISH),
Instytut Uprawny Nowozenia i Gleboznawstwa, Baborow (Poland).
R. Baranowski, and W. Ploszynska.
Pamiet Pulawski. 45. p 73-84. 1971. Illus. (English summary).
Identifiers: Amelioration, *Manure treatment, Physical properties, Porosity, *Sandy soil, Crop yield, *Soil treatment.

In order to investigate the efficiency of Egersegi's method an experiment on sandy soil was established by varying the plowing depth and the quantity of manure applied to the soil. After 5 yr the treatments were repeated. After 10 yr measurements of physical properties characterizing the compression and air-water-relationships in respective layers of the soil profile were performed. The amelioration increased the field capacity of soil but did not change the permanent wilting point and maximal hygroscopicity of the soil. The increase of water storage was from 10 to 25%. Plots with 2 manure applications showed a better pore distribution as a result of an increase of quantity of medium pores providing plants with water. Deep plowing and addition of organic matter changed the natural structure of the soil profile. The total porosity of the plowing layer decreased but the subsoil layer became looser. Yield increases were related to improved soil physical properties.--Copyright 1973, Biological Abstracts, Inc.
W74-00484

INCREASING THE EFFECTIVENESS OF IRRIGATED AGRICULTURE IN THE CHUY VALLEY OF KIRGHIZIA, (IN RUSSIAN),
D. S. Lailev, and V. K. Gorbunova.
Izv Akad Nauk Kirg SSR. 5 p 69-75. 1971.
Identifiers: Agriculture, *Irrigation, *USSR (Kirghizia), Farms.

Considerable variations in the effectiveness of production were observed in different zones and farms with irrigated lands.--Copyright 1973, Biological Abstracts, Inc.
W74-00490

YIELD AND CHEMICAL COMPOSITION OF COCKSFOOT IN DEPENDENCE OF NITROGEN FERTILIZATION AND WATER SUPPLY, (IN RESEARCH),
Instytut Uprawny Nowozenia i Gleboznawstwa, Baborow (Poland).
E. Stuczynski, J. Stuczynska, S. Jakubowski, and B. Jasinska.
Pamiet Pulawski. 44. p 119-144. 1971. Illus. (English summary).
Identifiers: Calcium, Chemical composition, *Cocksfoot, Fertilization, Irrigation, Magnesium, Minerals, *Nitrogen fertilizer, Phosphorus, Potassium, Sodium, Uptake, *Water supply, Crop yield.

N was applied in rates divided between 4 successive cuts. In one subblock plants were provided with water by rainfall only, while in the other rainfall deficiency was supplemented by tap water. A positive influence of irrigation on the yield increase of foddler cocksfoot and fertilized with N, but not with too high doses (720 kg N/ha) was found. The N fertilization decreased water utilization for the production of the dry matter unit. N fertilization caused some changes in chemical composition namely the increase of the content of total N, protein N and non-protein forms of N, especially of nitrate N, usually the increase of Ca, Mg, and Na content and the decrease of P and K content. Irrigation had no great influence on the P, K, Ca and Mg content but it increased Na and in general the decreased N content. Due to N fertilization the uptake of mineral components was greater and irrigation stimulated this uptake. The higher N doses decreased the sum of carbohydrates, while they did not change the content of raw fiber.--Copyright 1973, Biological Abstracts, Inc.
W74-00491

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

CHEMICAL AND BIOLOGICAL CHARACTER OF RIO GRANDE WATER IN THE BOSQUE DEL APACHE WILDLIFE REFUGE,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
D. K. Brandvold, J. A. Brierley, and C. J. Popp.
Available from the National Technical Information Service as PB-224 450, $3.50 in paper copy, $1.45 in microfiche. New Mexico Water Resources Research Institute La Cruces, Technical Completion Report 030, August 1973. 50 p, 4 fig, 12 tab, 21 ref. OWRR A-038-NMEX (2).

Descriptors: *New Mexico, *Wildlife, *Water quality, Eutrophication, *Water analysis, *Waterfowl, Microbiology, Aquatic microbiology, Salinity, Sediments, Biological properties, Chemical analysis, Nitrogen, Mercury (Metal), Biochemical oxygen demand, Water temperature, Dissolved oxygen, Dissolved solids, Silica, Sulfates, Nitrites, Chemical oxygen demand, Bacteria, Aquatic microorganisms, *Rio Grande River, Hydrogen ion concentration.
Identifiers: Specific conductance, Dissolved phosphates, Chloride, Fecal coliform, Uric acid.

The project purpose was to study the effects of a waterfowl refuge on water quality monitoring the physical, chemical, and biological character of the water in the Bosque del Apache Wildlife Refuge along the Rio Grande in Socorro County, New Mexico. A regular monthly monitoring program over the three-year study period was set up to collect and analyze water samples from eight points

within the refuge. The types of water monitored were as follows; water entering the refuge, water leaving the refuge, Rio Grande water within the refuge which served as a control since it was not used in refuge management, swamp water, irrigation water, fishing pond water, and high-water-fowl-use temporary ponds. The water used as a waterfowl habitat was not degraded in quality as a result of the presence of waterfowl. There was no increase in soluble nitrogen compounds or any other nutrient associated with eutrophication problems. There were no apparent bird-related changes in the microbiological parameters of water quality. However, impoundment of water for habitat ponds resulted in an increase of water salinity through concentration of dissolved ions by evaporation. The water used by the refuge had a high concentration of suspended sediments. This appears to effect the concentration of inorganic compounds and microbial populations by adsorption. (Creel-New Mexico)
W74-00007

EFFECT OF AN ERROR IN THE DETERMINATION OF THE MAXIMUM WATER EQUIVALENT OF SNOW IN A BASIN ON THE FORECAST ACCURACY OF THE SPRING FLOOD VOLUME,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02C.
W74-00110

EFFECT OF RIVER DISCHARGE REGULATION ON THE LOWER DON PHYTOPLANKTON, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
For primary bibliographic entry see Field 05C.
W74-00120

POLLUTION OF AIR, WATER AND SOIL BY LIVESTOCK,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 05G.
W74-00135

RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF CONTROL SYSTEMS,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 05G.
W74-00137

WEED HARVEST AND LAKE NUTRIENT DYNAMICS,
North Dakota Univ., Grand Forks. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-00150

FLOOD CONTROL MODEL FOR MULTI-RESERVOIR SYSTEMS,
Natal Univ., Durban (South Africa). Dept. of Civil Engineering.
J. S. Windsor.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 19 p, 4 fig, 5 ref.

Descriptors: *Water resources development, *Flood control, *Reservoirs, *Linear programming, Multiple-purpose projects, Optimization, Reservoir releases, Flood damage, Costs, Storage, Evaluation, Forecasting, Mathematical models, Systems analysis.
Identifiers: *Cost minimization, Operating policy, Time stage, Hydro-meteorological conditions, Flood periods.

A recursive linear programming model for the analysis of a system of flood control reservoirs is presented. The system is operated over a number of discrete time periods and the model is used to determine the operating policy which minimizes the downstream damage costs associated with the magnitude of reservoir releases. By dividing flood periods into shorter operational periods, it is shown how system policies may be adjusted to incorporate the latest forecast information, and thus ensure maximum flexibility under actual operating conditions. The method proposed recognizes component interaction in time and space and affords a means of evaluating the effects of forecasting. This is accomplished with a series of sequentially-related linear programming routines to cover the entire flood period, where the inputs to the model are adjusted at each time stage to reflect the changing storage and hydro-meteorological conditions. It is assumed that decisions regarding the number, location and size of the individual reservoirs have been previously made. (Bell-Cornell)
W74-00168

THE DEVELOPMENT OF METHODS FOR THE PLANNING OF UTILISATION AND PROTECTION OF YUGOSLAV WATER RESOURCES.
For primary bibliographic entry see Field 06A.
W74-00170

RESERVOIR OPERATION FOR RECREATION USABILITY,
Toronto Univ. (Ontario). Dept. of Urban and Regional Planning.
R. Jaakson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY10, Proceedings paper No 10058, p 1813-1822, October 1973. 2 fig, 6 tab, 5 ref.

Descriptors: *Reservoir operation, *Recreation facilities, *Drawdown, *Estimating, *Water level, Water requirements, Optimization, Sequencing, Storage capacity, Systems analysis, Mathematical models, *Canada.
Identifiers: *Trent Canal (Ontario-Canada), Shoreline physiography.

A model for the operation of the reservoir feeder-lakes of the Trent Canal in Ontario, Canada is presented. Using data which describe shoreline physiography and a scale which ranks shoreline recreation usability, coefficients are calculated which estimate the maximum water-level drawdown that a reservoir can tolerate. Matrix conventions are used to associate drawdown tolerances to the relative and the absolute storage capacity of the reservoirs. From the matrix, priority-ordering situations for reservoir operation are identified. The sequence of operation of reservoirs can be compared in various situations of reservoir water-storage depletion, and water requirements. The model allows shoreline physical recreation usability to be included in the rationale for reservoir operation, and it quantifies means whereby the effect of reservoir operation on recreation may be minimized. (Bell-Cornell)
W74-00185

OPTIMIZATION OF MULTIPLE RESERVOIR SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
W. J. Trott, and W. W-G. Yeh.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY10, Proceedings paper No 10065, p 1865-1884, October 1973. 5 fig, 6 tab, 17 ref.

Descriptors: *Reservoir design, *Dynamic programming, *California, Hydraulics, Size, Reservoir operation, Mathematical models, Algorithms, Storage capacity, Costs, Regression analysis, Methodology, Constraints, Systems analysis.
Identifiers: *Operating policy, *Net benefits, Successive approximation method, Gradient technique, Coarse grid method.

The design of a system of reservoirs includes the determination of the size of the reservoir to be built at each proposed reservoir site. The design is considered optimal when the net benefits, which are a function of the reservoir sizes and the operating policy, are maximized. A method is developed to determine the optimal design of any system of reservoirs with series and parallel connections; the technique is applied to a six reservoir system. For a specific set of reservoir sizes, the return from the system is determined from the optimal operating policy. This policy is determined by decomposing the original multiple state variable dynamic programming problem by Bellman's method of successive approximation into a series of subproblems of one state variable so that the sequence of optimizations over the subproblems converge to the solution of the original problem. The costs are assumed to be a function of reservoir size and are computed from storage capacity versus cost curves. A modified gradient technique is then used to determine the set of reservoir sizes which maximize the net benefits, subject to the imposed constraints. The coarse grid method is used in which the storage increment is varied from 100,000 acre-ft. to 1,000 acre-ft. The algorithm converges to each of the given storage increments. (Bell-Cornell)
W74-00188

DEVELOPING A COOPERATIVE RESEARCH PROGRAM FOR FLOOD CONTROL IN BRAHMAPUTRA VALLEY,
Brahmaputra Flood Control Commission (India).
For primary bibliographic entry see Field 10A.
W74-00195

HOW ENGINEERING RESEARCH IS REDUCED TO PRACTICE IN THE BUREAU OF RECLAMATION,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 10A.
W74-00200

DEVELOPMENT OF MATHEMATICAL MODELING CAPABILITIES FOR THE VISTULA RIVER PROJECT, POLAND,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 10A.
W74-00218

NEW FRONTIERS IN DRAINAGE AND RECLAMATION ENGINEERING IN THE INDUS PLAINS,
For primary bibliographic entry see Field 10A.
W74-00221

LAKE OKEECHOBEE SEEPAGE MONITORING NETWORK,
Geological Survey, Talahassee, Fla.
D. J. McKenzie.
Open-file report 73018, 1973. 64 p, 38 fig.

Descriptors: *Seepage, *Dikes, *Lakes, *Florida, Data collections, Monitoring, Groundwater movement, Aquifer characteristics, Water level fluctuations, Hydrogeology, Seepage control, Underseepage, Water loss, Hydrologic data, Hydrographs, Water wells, Sampling, Water analysis, Chlorides, Correlation analysis, Surface-groundwater relationships.
Identifiers: *Lake Okeechobee (Fla).

In 1962, the Central and Southern Florida Flood Control District requested the Geological Survey to evaluate the seepage beneath the Hoover Dike

along the south shore of Lake Okeechobee. Results of the study were reported by Meyer (1971) (See W72-02954). The study indicated, among other things, a need for a monitoring program which would be helpful in determining the effects that buildup of a filtercake in lakeside borrows and changes in drainage works would have on future seepage rates. This report summarizes the data collected at the five original monitoring sites along the south shore of Lake Okeechobee from January 29, 1970 to June 28, 1972. In order to use the hydrographs in this report to full advantage, they should be studied in conjunction with Meyer's graphs and text (1971). During steady-state conditions, water seeps from the lake through the filtercake and through the aquifers beneath the dike. At those sites where the filtercake is missing, or has about the same permeability as the aquifers, the seepage from the lake is about equivalent to the flow through the aquifers. Present data are insufficient to determine whether or not filtercake buildup has reduced seepage. No appreciable change in drainage occurred during the observed period. (Woodard-USGS)
W74-00337

RUNOFF FORMATION ON MOUNTAIN SLOPES UNDER CARPATHIAN BEECH AND SPRUCE FORESTS,
O. V. Chubatyy.
Soviet Hydrology: Selected Papers, No 3, p 278-286, 1971. 8 tab, 4 ref. Translated from Forestry (Lesovedeniye), No 3, p 72-80, May-June 1971.

Descriptors: Mountain forests, *Slopes, *Canopy, *Interception, *Runoff, Infiltration, Penetration, Rainfall-runoff relationships, Runoff coefficient, Surface-groundwater relationships, Base flow, Surface runoff, Overland flow, Forest watersheds, Clear-cutting, Water year, Seasonal.
Identifiers: *USSR (Carpathian Mountains), *Beech trees, *Spruce trees.

Carpathian beech and spruce forest trees intercept varying amounts of atmospheric moisture. Average annual amount of precipitation intercepted by the canopy of beech and spruce is 78% and 63.6%, respectively. In winter it amounts to 85.3% for beech and 56.6% for spruce and during the growing season it is 70.7% for beech and 68.6% for spruce. Total runoff in spruce forests is approximately 2.5 times greater than that in beech forests. Most runoff occurs in beech forests in winter and spring and in spruce forests in summer. Carpathian beech, and spruce have approximately the same effect on transformation of overland flow into subsurface and groundwater runoff. Differences in physiographic conditions are largely responsible for the increase in total runoff in spruce forests. The ratio of subsurface runoff to overland flow remains the same in both beech and spruce. Clear-cutting considerably reduces the water-regulating effect of the forest trees. (Josefson-USGS)
W74-00338

SPRING RUNOFF FROM SMALL CATCHMENTS WITH DIFFERENT FOREST COVER IN THE MOUNTAINS OF GEORGIA,
L. S. Azmayparashvili, and R. G. Chagelishvili.
Soviet Hydrology: Selected Papers, No 3, p 286-289, 1971. 2 fig, 2 tab, 5 ref. Translated from Forestry (Lesovedeniye), No 3, p 81-83, May-June 1971.

Descriptors: *Mountain forests, *Forest watersheds, *Small watersheds, *Runoff, Spring, Rainfall-runoff relationships, Discharge (Water), Overland flow, Slopes, Rain water, Snowmelt, Weirs, Seasonal.
Identifiers: USSR, *Georgian SSR.

Four catchment basins with varying degrees of forest cover were selected for study in the Boshur forested area of the Georgian Republic. The catchments have an average elevation of 1,400-1,500 m above sea level and a gradient of 25-30 deg. Average annual amount of precipitation is 600 mm. The forest trees on slopes of the catchment basins are mainly beech-hornbeam and oak-pine stands with an admixture of spruce, fir, aspen, and birch. Runoff from catchment basins is directly proportional to precipitation intensity and inversely proportional to density of forest cover. A catchment with a cover density of 70% has no overload flow, and the range of rainfall and snowmelt runoff fluctuations is negligible. A significant increase in spring rainfall runoff and its sudden cessation in small catchments with cover densities of 30% and 50% are due to overland flow of rainwater and snowmelt water, increased evaporation from the basin surface, and unfavorable conditions of groundwater discharge into streams. Catchment basins with cover densities of 30% and 50% do not produce stable runoff. (Josefson-USGS)
W74-00339

INFILTRATION PROPERTIES OF SOILS AND INTRAZONAL STRUCTURE OF THE HYDROLOGIC BUDGET (INFIL'TRATSIONNYYE SVOYSTVA POCHV I VNUTRIZONAL'NYYE OSOBENNOSTI STRUKTURY VODNOGO BALANSA),
For primary bibliographic entry see Field 02G.
W74-00341

OBSERVATIONS ON THE SOIL-WATER REGIMES IN A DRAINED CLAY SOIL,
Ministry of Agriculture, Fisheries and Food, Cambridge (England). Field Drainage Experiment Unit.
For primary bibliographic entry see Field 02G.
W74-00359

EFFECT OF AGRICULTURAL MANAGEMENT OF WET SLOPING SOIL ON NITRATE AND PHOSPHORUS IN SURFACE AND SUBSURFACE WATER,
Agricultural Research Service, Burlington, Vt. New England Watershed Research Center.
For primary bibliographic entry see Field 05B.
W74-00371

ESTIMATING THE PRECIPITATION CLIMATE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02A.
W74-00375

A STREAM LENGTH STUDY,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 02E.
W74-00380

DRAIN INSTALLATION FOR NITRATE REDUCTION,
Southwestern Irrigation Field Station, Brawley.
For primary bibliographic entry see Field 05G.
W74-00398

PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOSAL LAGOONS,
Agricultural Research Service, Washington, D.C. Agricultural Engineering Research Div.
For primary bibliographic entry see Field 05D.
W74-00430

CASE DESCRIPTION: MORRISON CREEK STREAM GROUP BASIN, CALIFORNIA,
For primary bibliographic entry see Field 06F.
W74-00448

METROPOLITAN DEVELOPMENT GUIDE, WATER RESOURCES POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 06B.
W74-00451

RIVERS AND AMERICANS: A CENTURY OF CONFLICTING PRIORITIES,
For primary bibliographic entry see Field 06G.
W74-00454

WATER CONTENT IN A PHYTOCOENOSIS, AND WATER BUDGET OF A ECOSYSTEM; OAK-FOREST OF VIRELLES, (IN FRENCH),
Brussels Univ. (Belgium). Laboratoire de Botanique Sysetematique et d'Ecologie.
For primary bibliographic entry see Field 02I.
W74-00474

APPLICATIONS OF LINEAR INTEGER PROGRAMMING TO PROBLEMS OF LAND USE ALLOCATION,
Michigan Univ., Ann Arbor. School of Natural Resources.
R. L. Patterson.
Available from the National Technical Information Service as COM-73-10408 $3.00 in paper copy, $1.45 in microfiche. SEA Grant Technical Report 31, MICHU-SG-72-213, June 1972. 36 p, 3 fig, 7 tab, 5 ref.

Descriptors: *Land use, *Alternative planning, *Linear programming, Optimization, Algorithms, Decision making, *Constraints, Costs, Equations, Mathematical models, Systems analysis, *Michigan.
Identifiers: *Allocation, Integer programming, Land use requirements, Resource requirements, Regulatory agencies, *Mission Peninsula (Mich).

Constraints in the allocation of land for uses can appear in many forms, such as budget limitations for development, measures of user satisfaction, environmental quality standards, and total amount of land available. No single model is adequate to cover all combinations of possible constraints. Presented are various land use allocation problems and the method used to solve them. The problems are constrained optimization problems--choosing the most preferred pattern of site uses from a limited set of alternatives. Developers determine their own preferences covering a limited set of sites; each opts to gain his maximum advantage so that the set of land use decisions is optimized from the collective points of views of this set of users. A simplified land use assignment problem solved by integer programming and a multiple land use assignment problem utilizing linear programming are described. Difficulties in formulating linear objective functions and in specifying cell size are discussed. Then a modified site assignment problem is presented in which the simplified land use assignment model is more realistically applied redefining sites as 'feasible' for 'specific' land use 'needs'; the algorithm assigns needs to feasible sites so as to minimize total cost. Finally, a special case of 'goals programming' is described and illustrated, using linear programming. (Bell-Cornell)
W74-00503

NAVIGATION CONDITIONS AT CONFLUENCE OF ARKANSAS, VERDIGRIS, AND GRAND RIVERS,
Army Enginner Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 08B.
W74-00539

STUDIES ON THE BIOLOGY AND CONTROL OF VAUCHERIA DICHOTOMA FOUND IN FRESHWATERS IN BRITAIN,
Ain Shams Univ., Cairo (Egypt). Faculty of Education.
For primary bibliographic entry see Field 02I.
W74-00541

WATER RESOURCES OF THE NISQUALLY INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
D. A. Myers, and J. E. Cummans.
Open-file report, 1973. 30 p, 5 fig, 12 ref, append.

Descriptors: *Water resources, *Water quality, *Indian reservations, *Washington, *Hydrologic data, Surface waters, Groundwater resources, Water yield, Streamflow, Water wells, Aquifer characteristics, Floods, Water utilization, Water analysis, Chemical analysis, Water level fluctuations, Projections, Water resources development.
Identifiers: *Nisqually Indian Reservation (Wash).

The Nisqually Indian Reservation, Washington, has an abundant supply of good-quality surface water and groundwater for increased housing and small-scale commercial development and for potential development of a fish hatchery or other aquaculture facilities. The average annual discharge of the Nisqually River is about 2,200 cfs Floods of the Nisqually River are reduced somewhat at La Grande and Alder Dams upstream. At the reservation, the river overflows its channel at discharges of about 21,000 cfs, which has one chance in six of happening in any one year. A floodflow of about 35,800 cfs would cover the flood plain to a depth of about 2 feet. Such a flood has one chance in 100 of happening in any one year. Yields from wells range from 5 to 25 gpm but appreciably greater yields are possible. (Woodard-USGS)
W74-00544

MUDDY CREEK DAM AND RESERVOIR, EMERY COUNTY, FEASIBILITY STUDY.
Rollins, Brown and Gunnell, Inc., Provo, Utah.
For primary bibliographic entry see Field 08A.
W74-00546

DRAINAGE AREAS OF TEXAS STREAMS, LAVACA RIVER BASIN.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02E.
W74-00548

4B. Groundwater Management

MODIFICATION OF WATER QUALITY DURING ARTIFICIAL GROUNDWATER RECHARGE,
A. M. Perlina, and V. M. Berdanov.
Soviet Hydrology: Selected Papers, No 4, p 391-396, 1971. 4 fig, 1 tab, 9 ref. Translated from Water Supply and Sanitary Engineering (Vodosnabzhenive i Sanitarnaya Tekhnika), No 7, p 1-4, 1971.

Descriptors: *Groundwater recharge, *Artificial recharge, *Water quality control, *Water treatment, *Water purification, Filtration, Filters, Water properties, Water supply, Curves.
Identifiers: *USSR.

Artificial recharge of groundwater by surface water from rivers, lakes, and reservoirs is being widely practiced in a number of countries to help meet domestic water demands. In the USSR artificially recharged groundwater is being used in water-supply systems of Riga, Kaunas, Novokuznetsk, Ivano-Frankovsk and other cities. The quality of water supplied to filtration plants should meet certain requirements. The suspended-particle concentration should not exceed 10-20 mg/liter, depending on particle size of the soil filter. Chromaticity, depending on its components, should not exceed 60 deg. The dissolved oxygen content of water, which governs permissible permanganate oxidation, should be within limits of 15 mg/liter. (Josefson-USGS)
W74-00116

THE DUSHANBE ARTESIAN BASIN AND ITS MINERAL AND THERMAL WATERS (DUSHANBINSKIY ARTEZIANSKIY BASSEYN I YEGO MINERAL'NYYE I TERMAL'NYYE VODY),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Geologii.
N. M. Churshina.
Izdatel'stvo 'Donish', Dushanbe, 1972. 210 p.

Descriptors: *Groundwater basins, *Confined water, *Mineral water, *Thermal water, *Springs, Hydrogeology, Artesian aquifers, Artesian wells, Discharge (Water), Seepage, Water chemistry, Water quality, Water temperature, Inorganic compounds, Water utilization, Geologic time, Stratigraphy, Structural geology.
Identifiers: *Tadzhikistan (USSR), *Dushanbe Artesian Basin (USSR), Paleogeography.

Aquifer complexes of highly confined, artesian mineral and thermal waters in Quaternary, Neogene, Paleogene, Upper Cretaceous, Lower Cretaceous, and Jurassic deposits of the Dushanbe Artesian Basin in the Gissar Valley of Tadzhikistan are described. Practical use of groundwater in the basin is discussed, and chemical composition, water temperature, and discharge of springs are tabulated. (Josefson-USGS)
W74-00117

ROLE OF DIGITAL COMPUTER MODELS OF AQUIFERS IN WATER RESOURCES PLANNING: CASE STUDY IN TUCSON, ARIZONA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
C. C. Kisiel, D. Supkow, and W. Tetley.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 22 p, 2 fig, 7 ref.

Descriptors: Water resources, *Planning, *Aquifers, *Computer models, Digital computers, *Groundwater, Management, *Arizona, Stochastic processes, Hydraulic models, Models studies, Evaluation, Forecasting, Water supply, Systems analysis, Economics, Risks.
Identifiers: *Tuscon (Ariz), *Error analysis, Data worth, Thermal models, Chemical models.

Aquifers have been operated with increasing frequency in conjunction with surface water systems. In some instances, as in Tucson, the aquifer serves as the only or primary source of water supply. The role of digital computer models of aquifers in planning and design and in guiding future data collection activities to reduce uncertainties in aquifer management is reviewed. An outline is presented of the elements of hydraulic, chemical and thermal modles of the Tucson aquifer. The hydraulic model is a constraint on efficient allocation of water within the basin either from a supply or a demand-oriented approach. The chemical models forecast total dissolved solids and nitrate movement from reclaimed wastewaters. The chemical and heat models are valuable in guiding pumping and recharge decisions. All the models can be used for analyses of the cost of forecast errors and for finding the economic worth of more data on pumpage, transmissivity, storage properties, recharge and water levels in reducing uncertainty. Experience indicates that while digital computer models of aquifers are not themselves sufficient to water resources planning, they are at least one necessary element in a more rational approach to such planning. Once such models are constructed they are easily updated and maintained as part of the planning process. (Bell-Cornell)
W74-00176

APPLICATION OF HYDROGEOLOGICAL DATA TO LONG-TERM ECONOMICS OF GROWING SUGAR CANE IN VENEZUELA,
Water Development Corp., Tuscon, Ariz.
For primary bibliographic entry see Field 10A.
W74-00196

NITRATE CONTENT OF WELL WATER IN WEST-CENTRAL WISCONSIN,
Wisconsin Univ., River Falls.
For primary bibliographic entry see Field 05B.
W74-00246

ARTIFICIAL-RECHARGE EXPERIMENTS AND OPERATIONS ON THE SOUTHERN HIGH PLAINS OF TEXAS AND NEW MEXICO,
Geological Survey, Austin, Tex.
R. F. Brown, and D. C. Signor.
Available from NTIS, Springfield, Va. 22151 as PB-222 921; Price $3.00 printed copy; $1.45 microfiche. Water-Resources Investigations 10-73, May 1973. 54 p, 19 fig, 6 tab, 50 ref.

Descriptors: *Artificial recharge, *Groundwater recharge, *Injection wells, *Texas, *New Mexico, Playas, Aquifers, Turbidity, Water quality, Water utilization, Irrigation practices, Municipal water, Industrial water, Aquifer characteristics, Evaluation.
Identifiers: *Southern High Plains (Tex and N Mex).

The Southern High Plains of Texas and New Mexico is an area where groundwater is being mined for irrigation, municipal supply, and industrial use. Artificial-recharge experiments and operations have been undertaken to develop methods to supplement the declining groundwater supplies in the Ogallala Formation, a sand and gravel aquifer of Tertiary age. Experiments using highly turbid water from playa lakes for injection into the Ogallala Formation have resulted in greatly decreased yield and limited life for the recharge wells. Recharge of groundwater and surface water of good quality have indicated, however, that injection through wells is an effective method of recharging the aquifer. Water that is slightly turbid can be injected into wells successfully for a period of time, but in most experiments, the use of turbid water resulted in constantly declining yields of the wells and constantly declining capacities for recharge. Redevelopment of wells through pumping and surging will move some of the sediment under certain conditions and significantly prolong the life of the recharge wells. Surface spreading is little practiced, but locally may be/a feasible means of artificial recharge. (Woodard-USGS)
W74-00325

DIGITAL SIMULATION AND PROJECTION OF WATER-LEVEL DECLINES IN BASALT AQUIFERS OF THE ODESSA-LIND AREA, EAST-CENTRAL WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 02F.
W74-00326

WATER IN THE SAN LUIS VALLEY, SOUTH--CENTRAL COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02A.
W74-00331

AVAILABILITY OF WATER FROM LIMESTONE AND DOLOMITE AQUIFERS IN SOUTHWEST OHIO AND THE RELATION OF

WATER QUALITY TO THE REGIONAL FLOW SYSTEM,
Geological Survey, Columbus, Ohio.
S. E. Norris, and R. E. Fidler.
Available from NTIS, Springfield, Va. 22151 as PB-222 558 Price $3.00 printed copy; $1.45 microfiche. Water-Resources Investigations 17-73, June 1973. 42 p, 13 fig, 1 tab, 13 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water quality, *Ohio, Water wells, Well data, Lithologic logs, Aquifers, Water yield, Drawdown, Specific capacity, Water supply, Chemical analysis.

The largest potential water supplies from the 150- to 450-foot thick carbonate-rock aquifer in southwest Ohio are available in a 2,800 square-mile area on the crest and east flank of the Cincinnati arch. The specific capacity of 26 test wells in this high-yield area ranged from 5.4 to 106 gallons per minute per foot of drawdown and averaged 30 gpm per foot. The specific capacity of 23 test wells in the same rocks outside the high-yield area ranged from 0.5 to 5.0 gpm per foot. Wells in the high-yield area produce mainly from the Newburg zone, a permeable stratum in the lower part of the Bass Islands Group, as used by the Ohio Division of Geological Survey. A structure contour map on the top of the Lockport Dolomite shows that the Newburg zone conforms to the configuration of the Cincinnati arch. The chemical quality of the water in the consolidated-rock aquifers is intimately related to the regional flow system and undergoes a progressive change from a calcium bicarbonate type in recharge areas to a calcium sulfate type in areas of natural discharge. (Woodard-USGS)
W74-00336

WATER-SALT BALANCE OF GROUNDWATER IN THE GOLODNAYA STEPPE IN 1969 (VODNO-SOLEVOY BALANS PODZEMNYKH VOD GOLODNOY STEPI ZA 1969 GOD),
Ministerstvo Geologii, Tashkent (USSR).
M. S. Alimov, and M. M. Inogamov.
Uzbekskiy Geologicheskiy Zhurnal, No 5, p 58-61, 1971. 1 fig, 4 tab, 4 ref.

Descriptors: *Groundwater, *Water balance, *Salt balance, *Grasslands, Water table, Base flow, Groundwater recharge, Water storage, Inflow, Precipitation (Atmospheric), Discharge (Water), Evaporation, Runoff, Infiltration, Irrigation water, Canals.
Identifiers: *USSR (Golodnaya Steppe).

The amount of water delivered to the water table in the Golodnaya Steppe in 1969 was 3,523.9 million cu m, of which 3,072.82 million cu m or 87.2% was groundwater discharge. The amount of water added to groundwater storage was 451.08 million cu m. In 1969 the Golodnaya Steppe received 6,493,000 metric tons of salt, of which 5,966,000 metric tons were removed. The total salt accumulation was 526,560 metric tons. The main sources of salt were irrigation water (4,445,400 metric tons) and atmospheric precipitation (1,600,450 metric tons). In 1969, as compared with 1960, groundwater recharge by rainfall penetration increased sharply (by 1,006.17 million cu m) as did losses from canals (by 356.29 million cu m). Infiltration from irrigated land decreased by 364.21 million cu m. Discharge of groundwater by evaporation and runoff increased by 547.74 million cu m and 458.74 million cu m, respectively. (Josefson-USGS)
W74-00340

HYDROGEOLOGICAL BASIS FOR PROTECTION OF GROUNDWATER AND WATER WELLS FROM POLLUTANTS (GIDROGEOLOGICHESKOYE OBOSNOVANIYE ZASHCHITY PODZEMNYKH VOD I VODOZABOROV OT ZAGRYAZNENIY),
For primary bibliographic entry see Field 05B.
W74-00347

GEOLOGY AND GROUND-WATER RESOURCES OF RUSH COUNTY, CENTRAL KANSAS,
Geological Survey, Lawrence, Kans.
J. M. McNellis.
Kansas Geological Survey Bulletin 207, July 1973. 45 p, 18 fig, 2 plate, 13 tab, 72 ref.

Descriptors: *Groundwater resources, *Geology, *Water wells, *Hydrologic data, *Kansas, Aquifer characteristics, Water yield, Water supply, Water utilization, Water quality, Groundwater movement, Groundwater recharge, Hydrogeology, Chemical analysis, Water levels.
Identifiers: *Rush County (Kans.).

Rush County, which comprises an area of 724 sq. mi in central Kansas, is principally in the Smoky Hills section of the Great Plains physiographic province. The north third of the county is in the Smoky Hill River drainage basin and the rest is in the Arkansas River drainage basin. The average annual precipitation at Bison is 22.21 inches. The principal aquifers are the Dakota Formation, which underlies the entire county, and the Pleistocene deposits in the stream valleys. Yields from wells in the Dakota generally are adequate for stock and domestic purposes, but the chemical quality of the water may be considered marginal for most uses. The Pleistocene aquifer in Walnut Creek valley yields 290 to 1,200 gpm to wells for irrigation. Yields as great as 1,500 gpm have been reported. Pleistocene deposits in other stream valleys yield adequate supplies for stock and domestic purposes. Water from Pleistocene deposits commonly is hard to very hard, but is satisfactory for most uses. Recharge to the aquifers is principally from local precipitation. The aquifer in Walnut Creek valley receives sizable amounts of recharge during periods of high flow in Walnut Creek. (Woodard-USGS)
W74-00352

GROUND-WATER CONDITIONS IN UTAH, SPRING OF 1973,
Geological Survey, Salt Lake City, Utah.
E. L. Bolke.
Utah Division of Water Resources Cooperative Investigations Report No 12, 1973. 101 p, 56 fig, 3 tab, 12 ref.

Descriptors: *Groundwater resources, *Water wells, *Water utilization, *Hydrologic data, *Utah, Basic data collections, Aquifer characteristics, Water yield, Pumping, Water level fluctuations, Groundwater recharge, Precipitation (Atmospheric), Water, quality, Correlation analysis, Hydrographs, Maps, Geology, Hydrogeology.

Individual discussions are presented of the most important areas of groundwater withdrawal in Utah for the calendar year 1972 and for the 10-year period 1963-72. Water-level fluctuations are described for the periods spring 1972 to spring 1973 and spring 1963 to spring 1973. The estimated total withdrawal of water from wells in Utah in 1972 was about 800,000 acre-feet, which is about 90,000 acre-feet more than for 1971 and about 200,000 more than for 1963. The increases for both the 1- and 10-year periods were due chiefly to increased withdrawal for irrigation. During 1972, precipitation was above normal in 4 of the State's 7 climatic divisions. However, precipitation was below normal for 5 of the first 6 months of 1972 for all Utah except the northern mountains. Groundwater levels were generally lower in the southwestern and central parts of Utah from February-March 1972 to February-March 1973 due to increased withdrawal for irrigation. Groundwater levels in northern Utah were variable, and no consistent pattern of water-level changes was evident. Supplementary data such as graphs showing chemical quality of water and maps showing water-table configuration are included. (Woodard-USGS)
W74-00353

A RECONNAISSANCE OF THE WATER RESOURCES IN THE PAHSIMEROI RIVER BASIN, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 02E.
W74-00356

STEADY STATE GROUND MOTIONS CAUSED BY SINGLE-WELL PUMPING,
Washington Univ., Seattle. Dept. of Civil Engineering.
C. B. Brown, and S. J. Burges.
Water Resources Research, Vol 9, No 5, p 1420-1427, October 1973. 5 fig, 1 tab, 10 ref.

Descriptors: *Subsidence, *Withdrawal, *Groundwater, *Elastic theory, Land subsidence, Groundwater movement, Drawdown, Water wells, Water yield, Equations.

Surface motions caused by well pumping often cause technical as well as legal problems. A small-deformation theory of such motions is formally developed for a single-well axially symmetric case. The theory involves no coupling between the fluid and solid phase; linear elasticity is used. Numerical comparison with field results suggests that this theory may be adequate to describe steady-state long-term ground motions. (Knapp-USGS)
W74-00361

ELECTRICAL RESISTIVITY SOUNDINGS ON THE COASTAL PLAIN OF SOUTHEASTERN VIRGINIA: A FEASIBILITY STUDY,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 02F.
W74-00437

GROUND WATER RECHARGE, SOUTHERN REGIONAL DISTRICT, MONTGOMERY COUNTY, OHIO, ENGINEERING STUDY AND REPORT, PHASE I.
Moulenbelt and Seifert, Dayton, Ohio.

Project 7204 (1973). 110 p, 46 fig, 10 tab, 26 ref.

Descriptors: *Aquifers, *Well data, *Groundwater recharge, Groundwater, Geology, Water supply, Pit recharge, Recharge wells, Water table, *Ohio.
Identifiers: Great Miami River, Montgomery County (Ohio).

The study looks at the feasibility of recharging the underground aquifer which supplies the Southern Regional District Well Fields in Montgomery County, Ohio. These wells are located in a wide valley of the Great Miami River which contains glacial deposits of stones, gravel, sand, and clay from 150 to 250 feet thick. The quantity of water pumped from this aquifer has steadily increased to about 45 MGD in 1972. Since 1964, when the withdrawal was 33 MGD, the groundwater levels have dropped considerably. Thus, this study focuses on a detailed inventory of past pumping rates and groundwater levels and on exploring and evaluating possible recharge methods and systems. Natural recharge in the area is poor because of a silt layer on the ground surface. However, it is recommended that two gravel pits along the bank of the Great Miami River be used for recharge. These pits can be supplied with water from the river or receive and store storm water from local outfalls. It is recommended that 12 MGD be used for recharge to return groundwater levels to those of 1964. No new production wells should be developed except to replace existing wells until recharge program has been established. A capital investment of $650,000 will be required for the recharge project. Operating expenses and ownership are estimated at $80,000 a year. (Elfers-North Carolina)
W74-00439

PRELIMINARY REPORT OF PUBLIC UTILITIES ANALYSIS.
Janesville Div. of Public Works, Wis.
For primary bibliographic entry see Field 03D.
W74-00458

RECONNAISSANCE OF THE WATER RESOURCES OF BEAVER COUNTY, OKLAHOMA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00534

GEOHYDROLOGY OF DONIPHAN COUNTY, NORTHEASTERN KANSAS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00536

REGIONAL SPECIFIC YIELD OF THE EDWARDS AND ASSOCIATED LIMESTONES IN THE SAN ANTONIO, TEXAS AREA,
Geological Survey, San Antonio, Tex.
For primary bibliographic entry see Field 02F.
W74-00542

WATER RESOURCES OF THE NISQUALLY INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 04A.
W74-00544

4C. Effects on Water of Man's Non-Water Activities

EFFECTS OF WATERSHED DEVELOPMENT ON WATER QUALITY,
Tennessee Valley Authority, Chattanooga. Water Quality Branch.
For primary bibliographic entry see Field 05C.
W74-00118

PICLORAM MOVEMENT FROM A CHAPARRAL WATERSHED,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 05B.
W74-00370

NUTRIENT LOSSES AFTER CLEAR-CUT LOGGING AND SLASH BURNING IN THE OREGON COAST RANGE,
Oregon State Univ., Corvallis. School of Forestry.
G. W. Brown, A. R. Gahler, and R. B. Marston.
Water Resources Research, Vol 9, No 5, p 1450-1453, October 1973. 1 fig, 1 tab, 4 ref.

Descriptors: *Nutrient removal, *Clear-cutting, *Runoff, Nitrates, Potassium, Phosphates, Nutrients, Sediment yield, Overland flow, Organic matter, *Oregon, *Small watersheds.

Nutrient release from three small watersheds in Oregon's Coast Range was monitored for 2 years before and 2 years after logging. One watershed, Flynn Creek (203.14 ha), served as an untreated control. Deer Creek (303.32 ha) was patch-cut. No change in the concentration or yield of nitrate nitrogen, phosphorus, or potassium was observed after logging. Needle Branch (70.68 ha) was clear-cut and burned. Maximum nitrate nitrogen concentrations increased from 0.70 to 2.10 mg/liter. Nitrate nitrogen concentrations returned to pre-logging levels by the sixth year after logging. Yield of nitrate nitrogen increased from 4.94 to 15.66 kg/ha the first year after treatment. Potassium concentrations increased markedly after burning from about 0.60 to 4.40 mg/liter but returned to prelogging levels within 2 months. Phosphorus concentrations were unchanged. These changes pose no threat to aquatic or terrestrial productivity. (Knapp-USGS)
W74-00381

LAND USE AS A FACTOR IN COASTAL WATER QUALITY,
California Univ., Berkeley.
For primary bibliographic entry see Field 02L.
W74-00383

DEMOGRAPHIC EFFECTS OF WATER DEVELOPMENT,
For primary bibliographic entry see Field 06D.
W74-00443

MAN'S EFFECT ON THE GREAT LAKES,
A. M. Beeton.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco. 1973. C. R. Goldman, editor p 250-280, 13 fig, 2 tab, 33 ref.

Descriptors: *Water quality, *Environmental effects, Coordination, *Great Lakes, *Eutrophication, Pollutants, Land use.
Identifiers: Intergovernmental cooperation.

Recommendations for problems generated by the impact of human, and especially urban development on the Great Lakes include: (1) establish an organization representing diverse interests and institutions to serve as a clearing house for developing a priority list of problems and for assigning projects for solution; (2) coordinate efforts of all governmental agencies; (3) disseminate information to all those concerned with Great Lakes use, conservation and management; (4) enforce all applicable water laws; (5) improve legislative basis for management; (6) establish environmental monitoring systems; (7) determine costs and benefits of improving water quality through pollution control; (8) develop water quality models for subregions; (9) examine feasibility of constructing large interception sewer systems along U.S. shores of Lakes Erie and Michigan to carry treated water into neighboring watersheds; (10) study use of dredged spoil for developing recreational lands; (11) consider development of deep water harbors; (12) emphasize the regional relationship between land use and water problems. Also discussed is accelerated eutrophication, noting a significant difference in the rate of deterioration between inshore and open lake waters. It is unrealistic to assume that the entire volume of a lake is available for dispersion and dilution of domestic, industrial and human wastes. The role of human activities in producing these changes is emphasized. (Edwards-North Carolina)
W74-00444

WATER DEVELOPMENT AND URBAN RECREATION,
For primary bibliographic entry see Field 06B.
W74-00446

4D. Watershed Protection

STABILITY CRITERIA FOR BOUND-ROCK EROSION PROTECTION,
Connecticut Univ., Storrs. Inst. of water Resources.
C. J. Posey.
Research Project Technical Completion Report, 1973. 2 p. OWRR A-035-CONN (1). OWRR 14-31-0001-3807.

Descriptors: *Erosion control, *Sediments, *Watershed management, Rock fill.
Identifiers: *Rock sausages.

Previous tests showed that the use of properly graded inverted filter layers could completely stop erosion of cohesionless soils, no matter how fine grained, and that the top layer of the filter was more resistant to being moved by strong currents if bound in mesh tubes. To find how much more resistant, three types of comparisons were made. For the first, after preliminary tests verified that the conclusion reached for cohesionless materials also applied to clay, the resistance of loose rocks and rock sausages (rock fragments encased in a tubular meshing) was compared under attack of a jet plunging through a pool. The second was based on the thrust of a high-velocity stream flowing over a level surface. The last compared fall velocities in quiet water. It was concluded that sausage diameter could safely be half that of solid rocks, but that even more could be gained by utilizing developed tension in the mesh tubes, which could be anchored.
W74-00390

WATERSHED PROGRAM LACKS ECOLOGICAL DIMENSIONS,
For primary bibliographic entry see Field 06G.
W74-00442

SKIPPACK WATERSHED AND THE EVANSBURG PROJECT: A CASE STUDY FOR WATER RESOURCES PLANNING,
For primary bibliographic entry see Field 06B.
W74-00445

NATURAL ENVIRONMENTAL ANALYSIS, NASHVILLE-DAVIDSON COUNTY, TENNESSEE.
Metropolitan Government of Nashville-Davidson County, Tenn. Planning Commission.
For primary bibliographic entry see Field 03D.
W74-00455

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

CHEMICAL AND BIOLOGICAL CHARACTER OF RIO GRANDE WATER IN THE BOSQUE DEL APACHE WILDLIFE REFUGE,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
For primary bibliographic entry see Field 04A.
W74-00007

DETECTION AND MEASUREMENT.
For primary bibliographic entry see Field 05B.
W74-00010

ENVIRONMENTAL MONITORING TECHNIQUES.
For primary bibliographic entry see Field 05B.
W74-00013

GAS-CHROMATOGRAPHIC DETERMINATION OF SELENIUM,
Kentucky Dept. of Health, Frankfort. Instrumentation Lab.
For primary bibliographic entry see Field 02K.
W74-00041

THE RATE OF LOSS OF MERCURY FROM AQUEOUS SOLUTION WHEN STORED IN VARIOUS CONTAINERS,
Idaho Univ., Moscow. Dept. of Chemistry.
R. M. Rosain, and C. M. Wai.
Analytica Chimica Acta, Vol 65, No 2, p 279-284, July 1973. 3 fig, 1 tab, 9 ref.

Descriptors: *Mercury, *Adsorption, *Water storage, *Aqueous solutions, *Plastics, Heavy metals, Hydrogen ion concentration, Acidity, Ions, Chemical analysis, Water analysis, Time, *Pollutant identification, Methodology.
Identifiers: Polyvinyl chloride, Chemical loss, Glass, Natural waters, Distilled water, Flameless atomic absorption spectrophotometry, Detection limits, Sample preparation.

Solutions of natural water and distilled water were spiked with mercury (II) (25 p.p.b.) and stored in polyethylene, polyvinyl chloride, and soft glass containers. Losses of mercury at different pH values were monitored by flameless atomic absorption for a total of 17 days. Severe losses of mercury were observed at pH 2 and 7. Mercury loss from solution followed first-order kinetics; the half-lives of mercury loss under various conditions were calculated. Acidification of the solutions to pH 0.5 with nitric acid curtailed mercury loss substantially. Possible ways of reducing the loss of mercury from environmental water samples are discussed. (Holoman-Battelle)
W74-00043

DETERMINATION OF SOME RARE-EARTH ELEMENTS BY PLASMA-JET EMISSION SPECTROMETRY,
Kitami Inst. of Tech. (Japan).
For primary bibliographic entry see Field 02K.
W74-00044

A NEW SET OF ACIDITY CONSTANTS FOR CARBONIC ACID AND BORIC ACID IN SEA WATER,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
I. Hansson.
Deep-Sea Research and Oceanographic Abstracts, Vol 20, No 5, p 461-478, May 1973. 3 fig, 9 tab, 34 ref.

Descriptors: *Sea water, *Chemical analysis, *Acidity, *Volumetric analysis, Carbonates, Methodology, Hydrogen ion concentration, Salinity, Water temperature, Chemical properties, Ions, Water analysis.
Identifiers: *Carbonic acid, *Boric acid, Potentiometric titration, Dissociation constants, Acidity constants, Inorganic acids.

The dissociation constants of carbonic acid, the acidity constant of boric acid, and the ionic product of water have been determined by potentiometric titrations in synthetic seawater. The interpolated values for the salinity range of 2-4 percent and the temperature range of 5-30C are given for carbonic acid, boric acid, and for pK10. The activity scale is chosen so that the activity coefficient approaches unity when the concentrations of H plus, OH minus, H2CO3 plus CO2, HCO3 minus, CO3 2 minus, B (OH)3 and B (OH)4 minus approach zero in synthetic seawater of a certain salinity. The concentration unit is M sub w, moles per kg solution. Experimental methods and activity scales used by Buch, Harvey, Wattenberg and Gripenberg (1932), Buch (1938) and Lyman (1957) are reviewed. Comparisons of the concentrations of the carbonate species in a sample, obtained by use of tables given by Buch, Lyman and this work, are tabulated. (Holoman-Battelle)
W74-00046

CAPACITIES OF SHALLOW WATERS OF SAGAMI BAY FOR OXIDATION AND REDUCTION OF INORGANIC NITROGEN,
Tokyo Univ. (Japan). Ocean Research Inst.
For primary bibliographic entry see Field 05B.
W74-00047

THE ENVIRONMENTAL FATE OF STRANDED CRUDE OIL,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05B.
W74-00049

SAMPLING THE EDIBLE MUSCLE OF THE SWORDFISH (XIPHIAS GLADIUS) FOR TOTAL MERCURY ANALYSIS,
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
H. C. Freeman, and D. A. Horne.
Journal of the Fisheries Research Board of Canada, Vol 30, No 8, p 1251-1252, August 1973. 1 fig, 1 tab, 2 ref.

Descriptors: *Sampling, *Mercury, Marine fish, *Heavy metals.
Identifiers: *Swordfish, *Muscle, Atomic absorption spectrophotometry, Biological samples, Xiphias gladius.

Samples from the longitudinal, depth, and transverse muscle sections of three swordfish were analyzed for total mercury by atomic absorption spectrophotometry. The objective was to determine whether a sample from any area would be representative of all muscle tissue. The total mercury was uniformly distributed in the edible muscle tissue of the swordfish demonstrating that a small sample from any region is representative of the whole muscle tissue. (Little-Battelle)
W74-00052

SEPARATION OF WATER FROM BIOLOGICAL AND ENVIRONMENTAL SAMPLES FOR TRITIUM ANALYSIS,
National Environmental Research Center, Las Vegas, Nev.
A. A. Moghissi, E. W. Bretthauer, and E. H. Compton.
Analytical Chemistry, Vol 45, No 8, p 1565-1566, July 1973. 1 fig, 2 tab, 3 ref.

Descriptors: *Tritium, *Separation techniques, Urine, Water, Aqueous solutions, Soil analysis, Water analysis, *Radioactivity techniques, Distillation, Hay, Milk, Chemical analysis, Plant tissues.
Identifiers: Azeotropic distillation, *Scintillation counting, Sample preparation, Tissue, Green chop, Reproducibility, Accuracy, Biological samples, Environmental samples, Animal tissues.

Azeotropic distillation of water using benzene has been tested as a means of separating water from biological and environmental samples for tritium analysis. Samples of soil, animal tissue, green chop, hay, milk, and urine were prepared using the technique, and the results of analyses compared with known or replicate values to determine accuracy and reproducibility. The results were comparable to those for samples prepared by distillation under various pressures and temperatures. However, azeotropic distillation has the advantages of short distillation time at normal pressure, does not require constant observation, and easy removal of the remaining sample for further processing. (Little-Battelle)
W74-00053

INORGANIC AND ORGANIC PHOSPHORUS DISTRIBUTION IN DOMESTIC AND MUNICIPAL SEWAGE,
Saskatchewan Univ., Saskatoon. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-00055

EFFECTS OF PH, LIGHT AND TEMPERATURE ON CARBARYL IN AQUEOUS MEDIA,
Oregon State Univ., Corvallis. Environmental Health Sciences Center.
For primary bibliographic entry see Field 05B.
W74-00056

POLYCHLORINATED TERPHENYLS IN THE ENVIRONMENT,
Rijksinstituut voor de Volksgizondheid, Utrecht (Netherlands). Lab. of Toxicology.
J. Freudenthal, and P. A. Greve.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 2, p 108-111, August 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Water analysis, *Oysters, *Eels, Water pollution effects, Polychlorinated biphenyls, Absorption.
Identifiers: *Polychlorinated terphenyls, *Human fat, *GC-mass spectrometry, *Rhine River, Bioaccumulation, Sample preparation, Macroinvertebrates.

Water from the Rhine River, oysters, eels, and human fat were analyzed by GC-mass spectrometry for polychlorinated terphenyls (PCT). The samples were extracted in n-hexane and cleaned up by column chromatography. All recent samples contained PCT. Two of three older samples of human fat contained no PCT. Residues of PCT were somewhat lower than PCB but were of the same order of magnitude. (Little-Battelle)
W74-00057

A SIMPLIFIED CLEAN-UP TECHNIQUE FOR ORGANOCHLORINE RESIDUES AT THE MICROLITER LEVEL,
Lund Univ. (Sweden). Dept. of Animal Ecology.
A. Sodergren.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 2, p 116-119, August 1973. 1 fig, 5 ref.

Descriptors: *Gas chromatography, *Chlorinated hydrocarbon pesticides, *Lipids, Algae, Birds, Fish, Separation techniques, DDD, DDT, Gravimetric analysis, *Pesticide residues.
Identifiers: Clean up, Sample preparation, Biological samples, p p' DDT, p p' DDD, *Organochlorine residues.

A clean-up procedure was developed, primarily for analysis of freshwater algae, in which trace amounts of chlorinated hydrocarbon pesticides and fat content can be determined by electron capture gas chromatography. Only 350 microliters of extract is required. Approximately 50 microliters of extract and an equal amount of fuming sulfuric acid are drawn into a glass tube which is then sealed by flame. The contents are mixed, centrifuged to separate phase, the tube is cut, and the acid discarded. The tube containing the hexane phase is then resealed until analysis. For confirmatory analysis, a part of the remaining original extract is cleaned up by treatment with potassium hydroxide. This is accomplished by heating a special pipette which is sealed at one end and drawing the KOH and extract into the tube as it cools. This is sealed, heated, reopened, water added, resealed, the contents mixed, and centrifuged. The hexane layer is removed and the remaining extract is analyzed for lipids by gravimetric analysis. Fatty and non-fatty samples have been cleaned-up by these procedures with residue recoveries of 78-94 percent. Treatment with KOH converts p,p'-DDT and p,p'-DDD to p,p'-DDE and p,p'-DDMU confirming the identity of the original products. The method was used to determine lipid fractions in muscle tissues of fish and birds. (Little-Battelle)
W74-00058

DETECTION OF TRACE AMOUNTS OF OIL IN SEA WATER BY FLUORESCENCE SPECTROSCOPY,
Bedford Inst., Dartmouth (Nova Scotia).
P. D. Keizer, and D. C. Gordon, Jr.
Journal of the Fisheries Research Board of Canada, Vol 30, No 8, p 1039-1046, August 1973. 5 fig, 4 tab, 8 ref.

Descriptors: *Pollutant identification, *Oil pollution, *Monitoring, Sampling, Calibrations, Separation techniques, Storage, Evaporation, Filtration, Water analysis, *Sea water, Oil spills, Equipment, Fluorescence.
Identifiers: Sample preparation, *Fluorescence spectroscopy, Petroleum oil, Gas liquid chromatography, Ultraviolet spectroscopy, Fuel oil, Crude oil, On board analysis.

Because of the potential usefulness of fluorescence spectroscopy for monitoring oil in seawater, studies were conducted to develop optimum procedures and identify limitations. Calibration, extraction, storage of extracts, and evaporation procedures were examined using seawater spiked with one of three kinds of oil or with polluted natural samples. Based upon the studies, recommended procedures were developed as briefly described. Samples should be collected in a clean plastic bucket or PVC Niskin sampling bottle and transferred to a 2-l polyethylene bottle. All glassware should be cleaned and rinsed with methylene chloride. Samples should be extracted twice with methylene chloride in a separatory funnel. Extracts should be drained into a glass bottle, sealed, and stored in the dark at low temperature until analysis. At analysis, water should be removed from the sample by a separatory funnel, methylene chloride removed in a rotary evaporator at 30C and reduced pressure, and the residue taken up with n-hexane. This solution is excited at 310 nm and the fluorescence measured at 374 nm. Comparison of the method with elemental analysis, uv spectroscopy, and GLC showed that for monitoring many samples it was sensitive and rapid. However, some limitations must be observed. Results of analysis of samples from several coastal inlets and along a section between Halifax and Bermuda show the usefulness of the method. (Little-Battelle)
W74-00059

GAS CHROMATOGRAPHIC PROCEDURE TO ANALYZE AMINO ACIDS IN LAKE WATERS,
Wisconsin Univ., Madison. Water Chemistry Program.
W. S. Gardner, and G. F. Lee.
Environmental Science and Technology, Vol 7, No 8, p 719-724, August 1973. 4 fig, 7 tab, 10 ref.

Descriptors: *Gas chromatography, *Methodology, *Chemical analysis, *Water analysis, Lakes, *Amino acids, Isolation, Evaluation, Cation exchange, Pollutant identification, *Wisconsin.
Identifiers: Dissolved free amino acids, *Sample preparation, Chemical recovery, Method evaluation, Precision, Accuracy, Ion exchange chromatography, Ligand exchange chromatography, Derivatives, Flame ionization gas chromatography, N-trifluoroacetyl methyl esters, *Lake Mendota (Wis.), Glycine, Alanine, Valine, Isoleucine, Threonine, Leucine, Serine, Proline, Tyrosine, Lysine, Phenylalanine, delta-Amino valeric acid, Error sources, Coefficient of variation.

A gas chromatographic procedure for the determination of free amino acids in lake water samples or hydrolyzates has been developed. A combination of ligand exchange and ion exchange chromatography was used to isolate and concentrate the amino acids from water samples. A semimicro derivative preparation technique was developed where the N-trifluoroacetyl methyl ester derivatives were formed. Recovery of the standard amino acids ranged from 53-93 percent. Poor recoveries were obtained for phenylalanine and lysine. Studies were made with fortified water samples to evaluate the precision and percent recovery of amino acids obtained with gas chromatographic procedures. The coefficients of variation generally were found to range between 5 and 20 percent for the various amino acids in the different procedures. The percent recoveries varied considerably among the respective amino acids. A brief experiment with frozen lake water filtrates suggested that freezing lowered the recovery of dissolved free amino acids. It was concluded that gas chromatography could be used to analyze lake water for selected amino acids after appropriate purification of the samples. The relative speed of analysis offers a distinct advantage over other available procedures, but more work is needed to improve the precision and accuracy of the described procedures and to permit analysis of the remaining common protein amino acids. (Holoman-Battelle)
W74-00061

THE PROBABLE OCCURRENCE OF HYDROXYLAMINE IN THE WATER OF AN ETHIOPIAN LAKE,
Haile Sellassi I Univ., Addis Adaba (Ethiopia). Faculty of Science.
R. M. Baxter, R. B. Wood, and M. V. Prosser.
Limnology and Oceanography, Vol 18, No 3, p 470-472, May 1973. 1 tab, 14 ref.

Descriptors: *Alkaline water, *Water analysis, *Pollutant identification, Lakes, Nitrites, Anions, Hydrogen ion concentration, Chemical analysis, Ammonia, Nitrates, Dissolved oxygen, Water sampling, Depth, Nitrogen compounds.
Identifiers: *Hydroxylamine, *Ethiopia (Lake Pawlo).

Fresh samples of water from all depths of Lake Pawlo, a moderately alkaline Ethipoian crater lake, frequently showed a marked increase in nitrite ion content after brief boiling. This did not occur, or was greatly reduced, in samples kept overnight before boiling. It is suggested that this was due to the presence of hydroxylamine. At the original pH of the water, oxidation of the hydroxylamine in the samples leads to nitrous oxide. When the sample is boiled, carbon dioxide is driven off and pH is increased. At this higher pH the oxidation of hydroxylamine follows a different pathway. Hydroxylamine may be a more frequent constituent of lake waters than has been assumed. (Holoman-Battelle)
W74-00067

INTERACTION OF YELLOW ORGANIC ACIDS WITH CALCIUM CARBONATE IN FRESHWATER,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 05B.
W74-00068

ORGANOCHLORINE INSECTICIDE RESIDUES IN STREAMS DRAINING AGRICULTURAL, URBAN-AGRICULTURAL, AND RESORT AREAS OF ONTARIO, CANADA - 1971,
Department of Agriculture, London (Ontario). Research Inst.
For primary bibliographic entry see Field 05B.
W74-00070

IDENTIFICATION OF CUTIN, A LIPID BIOPOLYMER, AS SIGNIFICANT COMPONENT OF SEWAGE SLUDGE,
Washington State Univ., Pullman. Dept. of Agricultural Chemistry.
P. E. Kolattukudy, and R. E. Purdy.
Environmental Science and Technology, Vol 7, No 7, p 619-622, July 1973. 5 fig, 16 ref.

Descriptors: *Lipids, *Sewage sludge, *Pollutant identification, Methodology, Solvent extractions, Chemical analysis, Domestic wastes, Organic compounds.
Identifiers: *Cutin, *Biopolymers, Aliphatic hydrocarbons, Thin layer chromatography, GC-Mass spectrometry, Sample preparation, Hydrogenolysis, Organic solvents, Alkanes, Mass spectra.

Sewage sludge, the end product of digestion in a domestic waste treatment plant, was thoroughly extracted with organic solvents. The residue on hydrogenolysis with $LiAlH_4$ gave polyhydroxy alkanes which accounted for 12-28 percent of the organic matter in the sludge. The major hydroxy alkanes were identified by means of chromatographic techniques in conjunction with mass spectrometry to be 1,18-dihydroxyoctadecene, 1,9,18-trihydroxy- and 1,10,18-trihydroxyoctadecane, 1,9,18-trihydroxy- and 1,10,18-trihydroxyoctadecene, 1,9,19,18-tetrahydroxyoctadecane, 1,9,10,18-tetrahydroxyoctadecene, 1,7,16-trihydroxyhexadecane, and 1,8,16-trihydroxyhexadecane. The structure and distributions of these components are unique and typical of the lipid polymer cutin. (Holoman-Battelle)
W74-00072

BASELINE CONCENTRATIONS OF LIGHT HYDROCARBONS IN GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-00073

WATER TEMPERATURE SURVEYS IN THE VICINITY OF POWER STATIONS WITH SPECIAL REFERENCE TO INFRA-RED TECHNIQUES,
Central Electricity Generating Board, Leatherhead (England). Central Electricity Research Labs.
D. J. Moore, and K. W. James.
Water Research, Vol 7, No 6, p 807-820, June 1973. 6 fig, 1 append.

Descriptors: *Water temperature, *Surveys, *Methodology, *Measurement, *Nuclear powerplants, Equipment, On-site investigations, Cooling water, Aerial photography, Powerplants, On-site tests, Water pollution effects, Surface waters, Thermometers, Depth, Infrared radiation, Isotherms, *Thermal pollution, Water analysis, Model studies.
Identifiers: *Infrared imagery, Thermistors, Airborne scanning, Sensors, Accuracy, Sensitivity, Infrared line scanner, Isodensitracers.

The use of three techniques for measuring water temperature is described in the context of field trials, at Berkeley Nuclear Power Station, made in 1967. Two of the techniques measure only the surface temperature of the water, the third using thermistors can record the temperature at varying depths. The techniques are complementary, but the infra-red line scan method has the great advantage of presenting a global picture of the surface temperature in a readily-digested form. Field experiments using these techniques can be most helpful in validating model studies and possible digital computer programs for examining the spread of warm water from power station cooling-water systems. (Holoman-Battelle)
W74-00076

GAS CHROMATOGRAPHIC DETERMINATION OF ALIPHATIC AMINES AND QUANTITATIVE ANALYSIS OF SMALL AMOUNTS OF DIMETHYLAMINE IN WASTEWATER,
Uniroyal Ltd., Guelph (Ontario). Research Labs.
F. I. Onuska.
Water Research, Vol 7, No 6, p 835-841, June 1973. 6 fig, 4 tab, 4 ref.

Descriptors: *Methodology, *Waste water (Pollution), *Chemical analysis, *Aqueous solutions, *Pollutant identification, Sewage, Industrial wastes, Water analysis, Pollutants, *Gas chromatography.
Identifiers: *Aliphatic amines, Flame ionization gas chromatography, Quantitative analysis, Retention time, Accuracy, Sensitivity, Dialkylamines, Trialkylamines, Monoalkylamines, Flame ionization detectors, Methylamine, Ethylamine, n-

Propylamine, n-Butylamine, Dimethylamine, Diethylamine, Ditn-butylamine, Trimethylamine, Triethylamine, n-Heptane, Di-n-propylamine, Tri-n-propylamine, Dibutylamine, Tributylamine.

A gas chromatographic procedure has been developed for the direct quantitative determination of primary, secondary and tertiary amines up to C4 in dilute aqueous solution. Industrial wastewater samples containing dialkylamines and standard dialkylamine solutions were analyzed by flame ionization gas chromatography using Pennwalt 223 amine packing for the columns which is stable to water and permits the separation of the amines in industrial wastewater and sewage. The method is sensitive, specific and free from the interferences of common low volatile degradation products in sewage. Kovats' retention indices are presented for C1-C4 mono-, di-, and trialkylamines and the response factors for dialkylamines using the FID detector are given. The linearity of the FID detector was also established for dimethylamine over the concentration range of 10-4000 mg/1. (Holoman-Battelle)
W74-00077

METHYLMERCURY AS PERCENTAGE OF TOTAL MERCURY IN FLESH AND VISCERA OF SALMON AND SEA TROUT OF VARIOUS AGES,
National Swedish Food Administration, Stockholm. Food Lab.
For primary bibliographic entry see Field 05C.
W74-00079

EXHAUSTIVE CHLORINATION AS A TECHNIQUE IN THE ANALYSIS OF AROMATIC HYDROCARBONS,
National Research Council of Canada, Halifax (Nova Scotia). Atlantic Regional Lab.
O. Hutzinger, W. D. J. Jamieson, S. S. Safe, and V. Z. Zitko.
Journal of the Association of Official Analytical Chemists, Vol 56, No 4, p 982-986, July 1973. 2 fig, 1 tab, 26 ref.

Descriptors: *Chemical analysis, *Methodology, Pollutant identification, Chemical reactions, Organic compounds, Chemical properties, Aromatic compounds, Polychlorinated biphenyls, *Chlorination.
Identifiers: *Aromatic hydrocarbons, Reagents, *Perchlorination reactions, Polycyclic compounds, Aroclor 1254, Decachlorobiphenyl, Trichlorosulfur tetrachloroaluminate, Dibenzofuran, Halowax 1014, Naphthalene, BMC, o-Tetradecachloroterphenyl, Polychlorinated terphenyls, Isomers, m-Tetradecachloroterphenyl, p-Tetradecachloroterphenyl, Anthracene, Octachloroanthraquinone, Antimony pentachloride iodine, Decachlorodiphenyl ether.

Perchlorination reactions of aromatic compounds have been further investigated. The preparation and properties of decachlorodiphenyl ether and the isomeric o-, m-, and p-tetradecachloroterphenyls are described. Anthracene, as an example of a polycyclic aromatic hydrocarbon, gave octachloroanthraquinone when treated with the antimony pentachloride iodine reagent, but quantitative conversion to decachloroanthracene could not be obtained with reagent BMC (sulfurylchloride-aluminum chloride-sulfur monochloride). A new reagent, trichlorosulfur tetrachloroaluminate (SCl3 (+)) A1C14 (-)), was shown to convert Aroclor 1254 to decachlorobiphenyl. As an application of the perchlorination technique it was shown that polychlorodibenzofurans (dibenzofuran) are not present at 0.5 microgram/g in samples of Halowax 1014 and technical naphthalene, respectively. Well defined derivatives could not be obtained when phthalate esters or 'hexabromobiphenyl' (fireMaster BP-6) were treated with the BMC or SbC15-I2 reagents. (Holoman-Battelle)
W74-00080

TASTE THRESHOLDS OF HALOGENS IN WATER,
Environmental Protection Agency, Boston, Mass.
For primary bibliographic entry see Field 05F.
W74-00119

WATER POLLUTION,
Geological Survey, Washington, D.C.
C. J. Robinove.
In: The Nation's Environment--Problems and Action, p 60-69, (1971). East Tennessee State University, Johnson City. 2 fig, 2 photo.

Descriptors: *Pollutant identification, *Analytical techniques, Thermal pollution, Water pollution sources, Pollutants, Water pollution control, *Remote sensing, Analytical techniques, Environmental effects.

Water pollution is a public problem and its solution requires public understanding, public motivation, and public action. The effective solution of pollution problems requires a greater knowledge and understanding of the world. Pollution may be distinguished as either physical pollution or biological pollution based on whether the consideration is the usability of water for particular uses or the usability of the water environment. The Cuyahoga River in Ohio is used as an example of the multiplicity of pollution problems associated with water. Discussed in this context are such factors as sediment, pollutant detection, pollutant measurement, source determination, assessments of effects. A river in the Delaware estuary is used as an example of thermal pollution, the Santa Barbara oil slick is used to illustrate the application of infra red photography to pollution identification, and the Imperial Valley of California is discussed as an example of vegetation, water, and land form identification. Application of new techniques is stressed as an effective way of expanding man's understanding of his environment as a necessary precondition to water pollution control. (Wadley-Florida)
W74-00124

WATER CHEMISTRY OF ELLICOTT CREEK, WESTERN NEW YORK,
Calspan Corp., Buffalo, N.Y.
M. W. Van Lier.
Paper presented at the 16th Conference on Great Lakes Research, April 16-18, 1973; 17 p, 4 fig, 1 tab, 7 ref.

Descriptors: *Water chemistry, Streams, Streamflow, *New York, Water temperature, Hydrogen ion concentration, Seasonal, *Dissolved oxygen, *Alkalinity, *Chlorides, *Conductivity, *Phosphorus.
Identifiers: Ellicott Creek (N.Y.).

Of the streams found in western New York State, the greatest contrast in quality with respect to both upstream-downstream changes and high-low flow changes, occur on Tonawanda and Ellicott Creeks. The latter body of water was the subject of an intensive six month investigation to determine changes in selected chemical variables occurring over the entire length of the stream. Temperature, dissolved oxygen, pH, alkalinity, chlorides, conductivity, and total phosphorus were measured biweekly at pre-selected stream locations. Marked seasonal changes occurred in all variables measured. Concentrations were notably affected by varying discharge rates in the stream. Pronounced diurnal variations were noted in temperature, oxygen, and pH values measured during a continuous 24 hour study. (Calspan)
W74-00166

HOLOGRAPHIC MICROSCOPY OF DIATOMS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Physics.
For primary bibliographic entry see Field 05C.
W74-00247

APPLICATION OF HIGH-SPEED LIQUID CHROMATOGRAPHY TO ORGANIC MICROANALYSIS. I. CONSTRUCTION OF A SIMPLE AND INEXPENSIVE APPARATUS,
City Univ. of New York.
For primary bibliographic entry see Field 02K.
W74-00249

PETROCHEMICAL ANALYTICAL PROBLEMS. II. GAS-LIQUID CHROMATOGRAPHIC-MASS SPECTROMETRIC INVESTIGATION OF INDUSTRIAL DODECYLBENZENES,
Magyar Tudomanyos Akademia, Veszprem. Research Group for Petrochemistry.
I. Otvos, S. Iglewski, D. H. Hunneman, B. Bartha, and A. Balthazar.
Journal of Chromatography, Vol 78, No 2, p 309-316, April 25, 1973. 2 fig, 6 tab, 18 ref.

Descriptors: *Chemical analysis, *Pollutant identification, Methodology, Chemicals, Organic compounds, Aromatic compounds.
Identifiers: *GC-Mass spectrometry, *Industrial dodecylbenzenes, *Petrochemicals, Characterization, Chemical composition, Flame ionization gas chromatography, Molecular weight, Sensitivity, Aromatic hydrocarbons, Dodecylbenzenes, Linearil, Marlikan, Dobane JN, DDB, 2-Methyl-2-phenyldecane, 2-Methyl-2-phenylundecane, 2-Methyl-2-phenyldodecane, Alkylindanes, Alkyltetralins, Undecylbenzenes, Aliphatic hydrocarbons.

The industrial dodecylbenzenes Linearil, soft and hard DDB, Marlikan, and Dobane JN were studied by gas-liquid chromatography - mass spectrometry (GLC-MS). Osmometric average molecular weights were measured with a Knauer vapor tension osmometer in benzene solution. The components of samples containing linear alkyl groups could be identified. The average molecular weights calculated from the measurements agree with independent molecular weight data. On the basis of the experimental data obtained, the following conclusions were reached: (1) The combined GLC-MS method provides reliable qualitative and quantitative analytical data for the most important characteristics of linear chain detergent alkylates, even when using a simple GLC-MS system. (2) The GLC-MS data could be controlled by independent methods and good agreement was found. (3) For branched chain products, the GLC-MS measurement yields only qualitative results of indicative character. The qualitative data may have some significance when making decisions regarding the applications of the substances, but it is more important to know the average molecular weight, which can be obtained only by other physical methods until the GC resolution can be significantly improved. (4) Alkyliadanes and/or alkyltetralins could be detected in each LB sample. (5) According to the molecular weight determinations, the products investigated are undecylbenzenes on average, but according to the literature data a mean carbon number of ca. 12.5 could be expected in the alkyl chain. (6) Unequivocal evidence could be obtained that within the sensitivity limits of the measurements (ca. 0.05 percent) on the products sold as biodegradable, 'soft' products, no branched chain isomers are to be found. (Holoman-Battelle)
W74-00250

VOLTAMMETRIC DETERMINATION OF NITRATE AND NITRITE IONS USING A ROTATING CADMIUM DISK ELECTRODE,
Iowa State Univ., Ames. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00251

SILICA GEL AS AN INSOLUBLE CARRIER FOR THE PREPARATION OF SELECTIVE CHROMATOGRAPHIC ADSORBENTS - THE PREPARATION OF 8-HYDROXYQUINOLINE SUBSTITUTED SILICA GEL FOR THE CHELA-

TION CHROMATOGRAPHY OF SOME TRACE METALS,
Rothamsted Experimental Station, Harpenden (England). Biochemistry Dept.
For primary bibliographic entry see Field 02K.
W74-00252

GAS-LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY OF ORGANOMERCURY COMPOUNDS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
G. L. Baughman, M. H. Carter, N. L. Wolf, and R. G. Zepp.
Journal of Chromatography, Vol 76, No 2, p 471-476, February 28, 1973. 2 fig, 2 tab, 22 ref.

Descriptors: *Pollutant identification, Chemical analysis, Chemical degradation, Degradation (Decomposition).
Identifiers: *Organomercury compounds, *GC-Mass spectrometry, *Gas liquid chromatography, Retention time, Flame ionization gas chromatography, Electron capture gas chromatography, Organomercurials, Methylmercury, Phenylmercury, Dimethylmercury, Methylmercuric iodide, Methylmercuric hydroxide, Phenylmercuric acetate, Methylmercuric bromide, Methylmercuric acetate, Methylmercuric chloride, Phenylmercuric chloride, Phenylmercuric borate, Diphenylmercury, Phenylmercuric hydroxide.

Gas-liquid chromatography-mass spectrometry (GLC-MS) was used to study GLC behavior of organomercury compounds, specifically, dimethylmercury and methylmercuric salts and phenylmercury compounds. For reference the compounds were chromatographed using flame ionization and electron capture detectors. Analyses of the methylmercury and phenylmercury compounds were performed, respectively, on 6 ft by 1/4 in glass columns containing Chromosorb W coated with 5 percent diethyleneglycol succinate and 3 percent OV-I on Chromosorb W. The data confirmed that at low concentrations all methylmercury salts give peaks having the same retention time and that ionic methylmercury compounds undergo decomposition during GLC. The decomposing proportion appears to increase as the sample size decreases. The phenylmercury salts, even at large sample sizes, decompose to give diphenylmercury (DPM) as the major product. Reliable analyses for methylmercury salts may be achieved using GC but only if specially treated columns are used to make the decomposition reactions reproducible. Since phenylmercury salts decompose extensively, GLC is not a good method for their analysis. (Holoman-Battelle)
W74-00253

THIN-LAYER CHROMATOGRAPHY AND ENZYME INHIBITION TECHNIQUES. INTRODUCTION,
Department of National Health and Welfare, Ottawa (Ontario). Health Protection Branch.
C. E. Mendoza.
Journal of Chromatography, Vol 78, No 1, p 29-40, April 11, 1973. 6 fig, 6 tab, 21 ref.

Descriptors: *Chromatography, *Pollutant identification, *Pesticide residues, *Analytical techniques, Pesticides, Chemical analysis, Methodology, Selectivity, Chemical reactions, Enzymes, Metabolism, Carbamate pesticides, Phosphothioate pesticides, Diazinon, Organophosphorus pesticides, Chlorinated hydrocarbon pesticides, DDT, DDD, DDE, Insecticides, Endrin, Aldrin, Dieldrin, Heptachlor.
Identifiers: *Thin layer chromatography, *Enzyme inhibition techniques, Biological samples, Detection limits, Sensitivity, Environmental samples, Aldicarb, Banol, Carbaryl, Carbofuran, Carbofuran 3-OH, Matacil, Metasystox-R, Mesurol, Tranid, Zectran, Baygon, Ethion, Malathion, Parathion, Alkaline phosphatase, Acid phosphatase, Dicofol, Methoxychlor, Perthane, Benzene hexachloride, Lindane, Isodrin, Heptachlor epoxide, Chlordane, Thiometon, Isobenzan, Endosulfan, Toxaphene, Nitrophenyl phosphate, Naphthyl phosphate, Methomyl, Demeton, Fenthion, Oxydemeton methyl, Dimethoate.

Thin-layer chromatography continues to be an integral part of analytical chemistry because it is versatile, sensitive, simple and rapid. The application of enzymatic methods to thin-layer chromatography is becoming more important. This chromatographic-enzymatic technique has been developed for studies of metabolic pathways of pesticides, residue analyses and forensic chemistry. The discussions deal with the development of chromatographic techniques using enzymatic reactions to detect pesticides and other biologically active compounds, principles of the technique, comparison of detection limits by various methods and enzymes, and practical applications of the technique and methods of quantitation. (Holoman-Battelle)
W74-00254

ULTRATRACE ANALYSIS (BELOW P.P.B.) BY COUPLING CENTRIPETAL THIN-LAYER CHROMATOGRAPHY AND GAS CHROMATOGRAPHY,
Ceskoslovenska Akademie Ved, Brno. Ustav Instrumentalni Analyticke Chemie.
J. Janak, V. Martinu, and J. Ruzickova.
Journal of Chromatography, Vol 78, No 1, p 127-131, April 11, 1973. 2 fig, 4 ref.

Descriptors: Methodology, *Chemical analysis, *Pollutant identification, Chlorinated hydrocarbon pesticides, Plant tissues, Pesticide residues, Gas chromatography, Insecticides, Laboratory tests.
Identifiers: *Trace levels, *Lindane, *Centripetal thin layer chromatography, *Electron capture gas chromatography, Detection limits, Sensitivity, Biological samples.

A method for the determination of ultratrace amounts of lindane by centripetal thin-layer chromatography combined with gas chromatography under common laboratory conditions is described. The method was used for the determination of pesticide contents in the dry material obtained from cabbage from a trial field. The accuracy of the analysis under conditions easily available in routine work is 0.1 ppb. The sensitivity limit of the method is 0.001 ppb with analytical precision. The combination of flat-bed and column techniques, suggested and represented by thin-layer centripetal chromatography plus GC with an electron-capture detector, will be most useful for ultratrace analysis. The possibility of processing relatively large volumes of solvents containing minute amounts of compound to be analyzed, without prior purification, will permit the wider utilization of the technique in the analysis of extracts of biological materials. (Holoman-Battelle)
W74-00255

THE USE OF PRESSURE-ASSISTED LIQUID CHROMATOGRAPHY IN THE SEPARATION OF POLYNUCLEAR HYDROCARBONS,
Metropolitan Police Forensic Lab., London (England).
C. G. Vaughan, B. B. Wheals, and M. J. Whitehouse.
Journal of Chromatography, Vol 78, No 1, p 203-210, April 11, 1973. 5 fig, 2 tab, 11 ref.

Descriptors: *Separation techniques, *Pollutant identification, Chemical analysis, Organic compounds, Temperature, Solvents, Methodology.
Identifiers: *Engine oil, *Polynuclear hydrocarbons, *Pressure-assisted liquid chromatography, Detection limits, Reproducibility, Fluorescence detectors, Mixtures, Ultraviolet detectors, Fluorimetric detectors, Chromatographic columns, Column preparation, Oil fingerprinting, Oil characterization.

The use of pressure-assisted liquid chromatography in the separation of polynuclear hydrocarbon mixtures in used engine oils is described. Several column packings have been investigated and columns containing Corasil/C18 have been shown to be capable of achieving useful and reproducible separations of these materials. The detection limits of the procedure using both ultraviolet and fluorescence detectors have been determined, and the effects of temperature and solvent composition on the separations were studied. (Holoman-Battelle)
W74-00256

CADMIUM CONCENTRATIONS IN SOME FISH SPECIES FROM A COASTAL AREA IN SOUTHERN NORWAY,
Norges Veterinarhoegskole, Oslo. Dept. of Biochemistry.
G. N. Havre, B. Underdal, and C. Christiansen.
Oikos, Vol 24, No 1, p 155-157, 1973. 1 tab, 7 ref.

Descriptors: Freshwater fish, Saline water fish, *Chemical analysis, *Cadmium, *Pollutant identification, Methodology, Herrings, Perches, Pikes, Heavy metals, Coasts, Solvent extractions, *Spectrophotometry.
Identifiers: *Atomic absorption spectrophotometry, Cod (Fish), Whiting, Coalfish, Animal tissues, Fat tissue, Bioaccumulation, *Norway, Sample preparation.

The method and results are reported for the analysis of fish for the presence of cadmium. Fish caught in a Norwegian coastal area were stored at minus 20C until analysis by atomic absorption spectrophotometry. Sample preparation involved homogenizing, wet ashing, adjusting the pH to 3.0, buffering, and solvent extraction using a mixture of APDC (ammonium pyrrolidine dithiocarbamate) and MIBK (methyl isobutyl ketone). The cadmium concentrations were low, varying from 0.003 to 0.012 microgram/g wet weight in cod, and from 0.002 to 0.029 microgram/g, and 0.003 to 0.033 microgram/g, in whiting and herring, respectively. The results could indicate a slightly greater accumulation of cadmium in fat fish as compared to lean fish. No correlation seems to exist between the cadmium concentration and the total weight of the fish. (Holoman-Battelle)
W74-00257

COMPOSITIONAL STUDIES OF A HIGH-BOILING 370-535 C DISTILLATE FROM PRUDHOE BAY, ALASKA, CRUDE OIL,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
H. J. Coleman, J. E. Dooley, D. E. Hirsch, and C. J. Thompson.
Analytical Chemistry, Vol 45, No 9, p 1724-1737, August 1973. 10 fig, 7 tab, 18 ref.

Descriptors: *Chemical analysis, Methodology, Pollutant identification, *Distillation, Organic compounds, *Alaska, Nuclear magnetic resonance, Aromatic compounds, Chemical degradation, Sulfur, Nitrogen, Separation techniques, Physical properties.
Identifiers: Chemical composition, *Crude oil, *Petroleum distillates, Boiling point, *Prudhoe Bay (Alas), *Oil characterization, Aromatic hydrocarbons, Gel permeation chromatography, Silica gel adsorption chromatography, Alumina gel adsorption chromatography, NMR spectra, Sample preparation, Petroleum residues, Light gasoline, Naphtha, Gas oil, Kerosene, Paraffins, Naphthenes.

In addition to providing some of the general characteristics of the Prudhoe Bay, Alaska, crude oil as determined by the Bureau of Mines routine method of analysis, this paper presents a com-

prehensive analytical characterization of a high-boiling 370y535C distillate. Following distillate preparation by several distillation steps in special distillation equipment, careful separating procedures with ion-exchange resins, coordination-complex formation of neutral nitrogen compounds with ferric chloride, and dual silica-alumina gel adsorption provided suitable concentrate fractions for further study. Subdivision of aromatics into three major aromatic types-monoaromatics, diaromatics, and polyaromatics-polar-greatly simplified subsequent separation and characterization studies. Monoaromatic, diaromatic, and polyaromatic-polar concentrates combined represent a large portion (45.5 percent) of the 370-535C boiling range distillate of the Prudhoe Bay, Alaska, crude oil, the importance of which justified detailed determinations of the number of rings involved, the relative aromaticity, and the degree of condensation of aromatic, naphthene, or heterocyclic rings. Further analytical separations by GPC, followed by determination of mass and NMR spectral data on the resulting GPC subfractions, provided a basis for determining a much more intelligible and reasonable understanding of compound type distributions for this specific high-boiling 370-535C Prudhoe Bay, Alaska, crude oil distillate. The end result is a scheme of sample preparation, analysis, and characterization that should be applicable to similar high-boiling distillates from other crude oils and of value to the petroleum industry in studies related to the origin of petroleum as well as its production, processing, storage, and usability. (Holoman-Battelle)
W74-00258

ADSORPTION OF TRACES OF INSECTICIDES FROM WATER ON POLYETHYLENE, (ADSORPTION VON SPUREN VON INSECTICIDEN AUS WASSER AN POLYATHYLEN),
Mainz Univ. (West Germany).
K. Beyermann, and W. Eckrich.
Zeitschrift fur Analytische Chemie, Vol 265, No 1, p 1-4, May 25, 1973. 5 fig, 1 tab, 2 ref.

Descriptors: *Adsorption, Water, *Separation techniques, *Insecticides, *Pesticides, Plastics, DDT, Aqueous solutions, Methodology.
Identifiers: *Pollutant removal, *Trace levels, Lindane.

Traces of pesticides, like lindane or DDT, are adsorbed from an aqueous phase to polyethylene. The different variables that influence the adsorption process are demonstrated. However, the procedure cannot be used for analytical purposes, as materials suspended in most of the water samples adsorb insecticides themselves. (Holoman-Battelle)
W74-00259

A SYSTEM FOR POLYACRYLAMIDE GEL ELECTROPHORESIS OF HUMIC ACIDS, (EIN SYSTEM ZUR POLYACRYLAMIDGELELEKTROPHORESE VON HUMINSAUREN),
Medizinische Akademie Erfurt (East Germany). Institut fuer Medizinische Mikrobiologie.
R. Klocking.
Journal of Chromatography, Vol 78, No 2, p 409-416, April 25, 1973. 5 fig, 1 tab, 9 ref.

Descriptors: *Humic acids, Methodology, *Separation techniques, Organic acids, Chemical analysis, *Water analysis, Hydrogen ion concentration, *Electrophoresis, Gels.
Identifiers: *Peat water, Polyacrylamide gel electrophoresis, Sodium dodecyl sulfate.

A system is described for the separation of humic acid fractions of different molecular weight. Using polyacrylamide gel electrophoresis the best results were obtained with a spacer gel of pH 10.3 and a separating gel of pH 8.9. Under these experimental conditions humic acids of peat water give two sharply bounded zones in sodium dodecyl sulphate free buffer and three bands in buffer containing 0.1 percent sodium dodecyl sulphate. (Holoman-Battelle)
W74-00260

A STUDY OF THE VARIATION WITH PH OF THE SOLUBILITY AND STABILITY OF SOME METAL IONS AT LOW CONCENTRATIONS IN AQUEOUS SOLUTION. PART II,
Imperial Chemical Industries Ltd., Northwich (England). Winnington Lab.
A. E. Smith.
Analyst, Vol 98, No 1164, p 209-212, March 1973. 3 tab, 6 ref.

Descriptors: *Aqueous solutions, *Cations, *Metals, *Pollutant identification, Hydrogen ion concentration, Stability, Solubility, Water storage, Methodology, Physical properties, Adsorption, Gold, Cadmium, Variability.
Identifiers: *Atomic absorption spectrophotometry, *Rare earth elements, *Trace levels, Barium, Bismuch, Indium, Lithium, Paladium, Platinum, Rhodium, Ruthenium, Antimony, Tin, Thallium, Chemical concentration.

Atomic-absorption spectrophotometry was used to determine trace levels of metal ions in aqueous solution containing 0.5 percent m/v of sodium chloride in order to investigate the effect of pH upon their stability, solubility and ease of adsorption during storage. Of the thirteen metal ions investigated, namely those of gold, barium, bismuth, cadmium, indium, lithium, palladium, platinum, rhodium, ruthenium, antimony, tin and thallium, with the exception of lithium, none is stable over the pH range from 1 to 11. To ensure the stability of solutions containing these ions it is necessary to acidify them to pH 1 with hydrochloric acid immediately after sampling. (Holoman-Battelle)
W74-00261

THE P-VALUE APPROACH TO QUANTITATIVE LIQUID-LIQUID EXTRACTION OF PESTICIDES AND HERBICIDES FROM WATER. 3. LIQUID-LIQUID EXTRACTION OF PHENOXY ACID HERBICIDES FROM WATER,
Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
I. H. Suffett.
Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 591-598, July/August 1973. 1 fig, 10 tab, 25 ref.

Descriptors: *Solvent extractions, *Separation techniques, *Herbicides, *Pollutant identification, *Chlorinated hydrocarbon pesticides, Aqueous solutions, Methodology, Pesticide residues, Water pollution, Ethers, 2 4 5-T, 2 4-D, Adsorption, Dalapon, Gas chromatography, Water analysis, Chemical analysis, Rivers.
Identifiers: *Liquid-liquid extraction, Chemical recovery, Isopropyl ester, n-Butyl ester, Distilled water, Natural waters, Ethyl acetate, Organic solvents, Benzene, Esters, MCPA, 2-CPA, 4-CPA, 2 4-DB, Silvex, Ultraviolet spectrophotometry, Electron capture gas chromatography.

The goal of aqueous herbicide analysis is the recovery of 100 percent of an herbicide for qualitative and quantitative analysis. Liquid-liquid extraction is the method of choice for quantitative recovery from water. The p-value concept is useful in developing an understanding of the liquid-liquid extraction process in order to select optimum experimental conditions to approach 100 percent herbicide recovery. The best solvents for extraction of phenoxy acid herbicides are ethyl acetate and ether. The best solvents for simultaneous extraction of 2,4-D or 2,4,5-T and their n-butyl and isopropyl esters are ether and ethyl acetate (2,4-D and esters) and benzene (2,4,5-T and esters). Possible variation of the p-value caused by alteration of natural water characteristics was tested. The apparent p-values for 2,4-D obtained with waters from different sources and the p-value found in distilled water were found to be consistent. Adsorption characteristics of herbicide esters were changed upon adjustment of turbid water to the aqueous characteristics of the p-value method. Therefore the aqueous sample should be filtered before adjustment of aqueous conditions for liquid-liquid extraction. The p-value gives a theoretical guide (an F sub n value) for development of an aqueous residue procedure. Recovery data from the literature and a recovery study at high concentration confirmed the calculated F sub n value. A two-step serial extraction with 200 and 50 ml of ethyl acetate under p-value conditions is the choice for extracting 99 percent of 2,4-D from 1 1. of aqueous solution. (See also W73-10505) (Holoman-Battelle)
W74-00262

ON THE QUANTITATIVE DETERMINATION OF FREE CARBON DIOXIDE IN NATURAL WATERS, (ZUR QUANTITATIVEN BESTIMMUNG DER FREIEN KOHLENSAURE IN NATURLICHEN WASSERN),
For primary bibliographic entry see Field 02K.
W74-00263

ISOMERIZATION OF GAMMA-BHC TO ALPHA-BHC IN THE ENVIRONMENT,
Wisconsin Univ., Madison. Dept. of Entomology.
For primary bibliographic entry see Field 05B.
W74-00264

THE INFLUENCE OF AN INDUSTRIAL PLANT ON THE CHEMISTRY OF QUATERNARY WATERS IN ITS VICINITY, UPPER ODRA RIVER VALLEY, (IN POLISH),
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
A. S. Kleczkowski, and J. Kowalski.
Bull Acad Pol Sci Ser Sci Terre. Vol 20, No 1, p 65-70. 1972.
Identifiers: Industrial wastes, *Poland (Upper Odra River), Quaternary waters, Rivers, Valley, Water pollution, Air pollution, *Chemical wastes.

From an area of 100 square km surrounding a chemical plant, more than 400 samples of water were taken in monthly series (1969-1970). In the non-isolated water-bearing horizon, marked changes in the chemical composition of water down to 15 m depth were established (SO4, Cl, Na + K, NO3 mineralization). This is connected with hydrochemical characteristic zonality and extension of pollution by chimney exhalations into the atmosphere and their infiltrations (S and N).--Copyright 1973, Biological Abstracts, Inc.
W74-00266

EXTRACTION OF DISPERSED OILS FROM WATER FOR QUANTITATIVE ANALYSIS BY INFRARED SPECTROPHOTOMETRY,
National Environmental Research Center, Edison, N. J. Edison Water Quality Research Div.
M. Gruenfeld.
Environmental Science and Technology, Vol 7, No 7, p 636-639, July 1973. 4 fig, 6 ref.

Descriptors: *Solvent extractions, *Separation techniques, *Oil, *Oily water, Methodology, Water analysis, Pollutant identification, Chemical analysis, Oil spills, Sodium chloride, Pollutants, Oil pollution.
Identifiers: Trichlorotrifluoroethane, *Infrared spectrophotometry, *Quantitative analysis, Carbon tetrachloride, Organic solvents, Extraction efficiency, Sample preparation, Freon 113, South Louisiana crude oil, Bachaquero crude oil, No 6 fuel oil, No 2 fuel oil, Absorbance, Sulfuric acid.

An improved extraction procedure can be used to extract dispersed oils from water for quantitative

analysis by infrared spectrophotometry. This procedure involves the addition of 50 percent H2SO4 and HCl to 1-liter samples and extraction with four 25-ml portions of Freon 113 in 2-liter separatory funnels. Checks for acidity (below pH 3) and completeness of extraction should be made. A 'blank' determination is recommended for reagents and water in order to prevent interference with the oil measurement at 2930/cm by extraneous solvent extractable organics. Some of the parameters that optimize such extractions were examined. The organic solvents trichlorotrifluoroethane and carbon tetrachloride were compared in relation to extraction efficiency. Both solvents were found to be useable for the infrared determination of oil and to be about efficient in extracting dispersed oils. However, trichlorotrifluoroethane (Freon 113) is preferred since it is much less poisonous to laboratory personnel. Changes in extraction efficiency following small additions of sulfuric acid and sodium chloride were examined. Great improvement results in extraction efficiency, but no further improvement derives from addition of more salt. (Holoman-Batelle)
W74-00267

BIODEGRADABILITY OF NONIONIC SURFACTANTS: SCREENING TEST FOR PREDICTING RATE AND ULTIMATE BIODEGRADATION,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
For primary bibliographic entry see Field 05B.
W74-00269

THE DETERMINATION OF CHROMIUM IN HUMAN URINE BY GAS CHROMATOGRAPHY USING A FLAME PHOTOMETRIC DETECTOR WITH A 425, 4 NM FILTER,
Environmental Protection Agency, Perrine, Fla. Perrine Primate Lab.
R. Ross, and T. Shafik.
Journal of Chromatographic Science, Vol 11, No 1, p 46-48, January 1973. 3 fig, 2 tab, 18 ref.

Descriptors: *Chromium, *Urine, *Chemical analysis, *Pollutant identification, *Gas chromatography, Heavy metals, Methodology, Pollutants, Monitoring, Aqueous solutions.
Identifiers: *Flame photometric gas chromatography, Biological samples, Chemical recovery.

The determination of low levels of chromium as chromium (III) trifluoroacety lacetonate has been previously achieved by GC using an electron capture detector. Conventional detectors, such as the electron capture detector, are sensitive but not very specific. Replacement of this detector system with a flame photometric detector equipped with a 425.4 nm filter (specific for chromium) affords both the sensitivity and specificity necessary for monitoring levels of chromium in human urine samples. The detector is linear in the range of 0 to 90 nanograms of chromium. Determination of chromium in human urine using this system has the advantages of greater specificity and linear range, as compared with other GC detector systems. The sensitivity of this system is adequate for monitoring levels of chromium in human urine. (Holoman-Battelle)
W74-00270

COUPLING OF HIGH SPEED PLASMA CHROMATOGRAPHY WITH GAS CHROMATOGRAPHY,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
For primary bibliographic entry see Field 02K.
W74-00271

AN ON-LINE SPECTROPHOTOMETER FOR COLLECTION OF MANIPULATION OF ABSORBANCE SPECTRA,
Georgia Univ., Athens. Dept. of Biochemistry.
For primary bibliographic entry see Field 07C.
W74-00272

MICRODETECTION OF NITRATE WITH MALACHITE GREEN OR CONGO RED,
V.S. Sanatan Dharma Coll., Kanpur (India). Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00273

A FLUOROMETRIC METHOD FOR THE DETERMINATION OF NITRILOTRIACETIC ACID,
Missouri Univ., Kansas City. Dept. of Chemistry.
J. L. Robinson, and P. F. Lott.
Microchemical Journal, Vol 18, No 2, p 128-136, April 1973. 2 fig, 4 tab, 20 ref.

Descriptors: *Nitrilotriacetic acid, *Water analysis, *Pollutant identification, *Methodology, *Fluorometry, Potable water, Chemical analysis, Organic compounds, Iron, Chemical reactions, Surfactants, Water pollution, Separation techniques.
Identifiers: Chemical interference, Precision, Detection limits, Gallium, Sample preparation, Oxine.

An indirect fluorometric procedure has been described for determining trace amounts of nitrilotriacetic acid (NTA) in water. This method is based upon the reaction of NTA with the Fluorescent Ga (III)-8-hydroxyquinoline complex. In order to obtain good results, the reagents should be added in this sequence: Ga (III, oxine, buffer, NTA, and then extraction. Interference studies showed that iron greatly interferes with this analytical procedure. Tap water samples were analyzed with a relative standard deviation of 10 percent or less. This method is relatively fast and does not require expensive equipment. (Holoman-Battelle)
W74-00274

DIRECT DETERMINATION OF BISMUTH AND ANTIMONY IN SEA WATER BY ANODIC STRIPPING VOLTAMMETRY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00275

IMPROVED APPARATUS FOR DETERMINATION OF MERCURY BY FLAMELESS ATOMIC ABSORPTION,
New England Aquarium, Boston, Mass.
T. R. Gilbert, and D. N. Hume.
Analytica Chimica Acta, Vol 65, No 2, p 461-465, July 1973. 2 fig, 1 tab, 7 ref.

Descriptors: *Mercury, *Laboratory equipment, Methodology, *Aqueous solutions, Instrumentation, Chemical analysis, Heavy metals, Pollutant identification, *Spectrophotometry.
Identifiers: *Trace levels, *Flameless atomic absorption spectrophotometry, Detection limits, Absorbance, Sensitivity, Sample size.

An extremely efficient purging technique is described which makes use of inexpensive equipment to measure sub-part-per-billion concentrations of mercury rapidly and over a wide range of sample sizes. The components of the apparatus are a regulated source of purge gas, flowmeter (100-1000 ml/min range), Pyrex Buchner-type funnel, and a 10-15 cm absorption cell with windows transparent at 253.7 nm. The treated sample is placed in the funnel to which is added the tin (II) reducing agent. The funnel is quickly stoppered and the purging gas and recorder are tuned on. When the pen returns to the base line, the gas flow is stopped and either a new sample added or a dilute mercury (II) chloride standard is injected in the reduced sample. The gas is again turned on and the absorbance measured. With the method described, 25 ng of mercury in a 100-ml sample with 5 ml of reductant purged at a gas flow rate of 16 ml/s in a 150-ml Buchner funnel gave a signal which reached maximum in 10 s and returned to base line in about 75 s. This peak height was 50 percent greater than the steady-state maximum (reached in about 1 min) obtained on an identical sample when the recirculation pump system and 300-ml BOD bottle sample holder supplied with a MAS 50 was used. Funnels of 30-, 60- and 150-ml capacity were used for sample sizes of 2-100 ml. Over this range several trends were observed: (1) The smaller the sample, the better the absolute sensitivity of the system. The detection limit for a 5-ml sample was 0.6 ng, but for a 50-ml sample, 2 ng. (2) The larger the sample volume the better the relative sensitivity of the technique, from a 0.12-p.p.b. detection limit for a 5-ml sample to 0.04 p.p.b. for a 100-ml samples. Practical application has been made to measuring Hg present in seawater, marine sediments, fish and other marine organisms, and clothing material. (Holoman-Battelle)
W74-00276

STAPHYLOCOCCI AND MICROCOCCI IN SWIMMING-BATH WATER, (IN GERMAN),
L. Gruen, and H. Kleybrink.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 155, No 5, p 384-390. 1972. English summary.
Identifiers: *Micrococci, *Staphylococci, *Swimming baths, Water pollution, *E. coli.

Samples (224) of water collected from 3 swimming-baths were examined bacteriologically and chemically. With regard to the total numbers of organisms present and the Escherichia coliliters, the water from these swimming-baths was regarded as satisfactory. All samples contained micrococci and 34% of them contained pathogenic staphylococci, although the content of the water in chlorine was as high as 2 mg/l of Cl2. The cause for and the significance of the presence in the bathwater of staphylococci are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-00277

INFLUENCE OF HEATING RATE ON ANALYTICAL RESPONSE IN FLAMELESS ATOMIC ABSORPTION SPECTROMETRY,
Bari Univ. (Italy). Inst. of Analytical Chemistry.
G. Torsi, and G. Tessari.
Analytical Chemistry, Vol 45, No 11, p 1812-1816, September 1973. 1 fig, 12 ref.

Descriptors: *Analytical techniques, *Heating, Rates, *Chemical analysis, Chromium, Heavy metals, *Spectrometers, Performance, Temperature, Instrumentation, Evaporation, Theoretical analysis, Absorption.
Identifiers: *Flameless atomic absorption spectrophotometry, Graphite rod atomizer, Sensitivity, Detection limits.

A graphite rod flameless atomic absorption spectrometer was assembled with high chopping speed, fast response, and good noise rejection. The influence of the input power on the analytical sensitivity was investigated using chromium as a probe for rods of different geometrical dimensions. In satisfactory agreement with the theoretical model, a linear relationship was found between the peak absorption with both the input power and the thermal derivative at the evaporating surface. The possibility of obtaining kinetic information about the evaporation process is discussed. A new detection limit value, 2 picograms for chromium, is also reported. (Holoman-Battelle)
W74-00278

MESITYL OXIDE AS AN EXTRACTING AGENCY FOR BERYLLIUM,
Indian Inst. of Tech., Bombay. Dept. of Chemistry.

For primary bibliographic entry see Field 02K.
W74-00280

IMPROVEMENTS IN THE MANGANESE DIOXIDE COLLECTION OF TRACE LEAD AND BISMUTH IN NICKEL,
International Nickel Co. of Canada Ltd., Sheridan Park (Ontario). J. Roy Gordon Research Lab.
For primary bibliographic entry see Field 02K.
W74-00281

ANALYSIS OF EXPLOSIVES IN SEA WATER AND IN OCEAN FLOOR SEDIMENT AND FAUNA,
Naval Ordnance Lab., White Oak, Md.
J. C. Hoffsommer, D. J. Glover, and J. M. Rosen.
Available from the National Technical Information Service as AD-757 778, $3.00 in paper copy, $1.45 in microfiche. Report No NOLTR-72 215, September 11, 1972. 19 p, 3 ref, append.

Descriptors: *Sea water, *Sediments, *Marine animals, *Gas chromatography, Chemical analysis, Water analysis, Marine fish, Separation techniques, Monitoring, Water pollution effects, Waste disposal, Atlantic Ocean, Pacific Ocean, Pollutant identification.
Identifiers: Rattail fish, Sea cucumber, Thin layer chromatography, Munitions, TNT, RDX, Tetryl, Ammonium perchlorate, Macroinvertebrates, Sample preparation, Biological samples.

Samples of seawater, sediment, and ocean bottom fauna (rat tail fish and sea cucumbers) were collected for analysis from two sites in the Atlantic and Pacific Oceans where surplus and obsolete munitions had been dumped. Samples were refrigerated during storage, then extracted with benzene and analyzed for TNT, RDX, and Tetryl using a combination thin layer and gas chromatography technique. Ammonium perchlorate was measured by its reaction with tetraphenylarsonium chloride which produced an insoluble perchlorate salt. No explosive contaminants were found in any of the samples analyzed. (Little-Battelle)
W74-00285

BIS-AROYLHYDRAZONES OF ALPHA--DIKETONES AS REAGENTS FOR COLORIMETRIC AND FLUORIMETRIC DETERMINATIONS OF CALCIUM, CADMIUM AND OTHER CATIONS,
Greenlane Hospital, Auckland (New Zealand). Pathology Dept.
For primary bibliographic entry see Field 02K.
W74-00286

POLLUTED SNOW IN SOUTHERN NORWAY AND THE EFFECT OF THE MELTWATER ON FRESHWATER AND AQUATIC ORGANISMS,
Oslo Univ. (Norway). Zoological Lab.
For primary bibliographic entry see Field 05C.
W74-00287

THE SOLVENT EXTRACTION OF THE TERNARY COMPLEXES OF IRON (II)--RHODAMINE B WITH VARIOUS NITROSOPHENOLS. DETERMINATION OF IRON IN WATERS,
Okayama Univ. (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00288

MULTIELEMENT INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF BIOLOGICAL MATERIALS,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00289

SALTING-OUT OF ACETONE FROM WATER -BASIS OF A NEW SOLVENT EXTRACTION SYSTEM,
Kentucky Univ., Lexington. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00290

ORGANOCHLORINE RESIDUES IN ESTUARINE MOLLUSKS, 1965-72 - NATIONAL PESTICIDE MONITORING PROGRAM,
Environmental Protection Agency, Gulf Breeze, Fla. Office of Pesticide Programs.
For primary bibliographic entry see Field 05C.
W74-00291

DETERMINATION AND DIFFERENTIATION OF ETHYLENEDIAMINETETRA-ACETIC ACID (EDTA) AND NITRILOTRIACETIC ACID (NTA) IN FRESHWATER,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
K. L. E. Kaiser.
Water Research, Vol 7, No 10, p 1465-1473, October 1973. 2 fig, 4 tab, 40 ref.

Descriptors: *Nitrilotriacetic acid, *Spectrophotometry, *Pollutant identification, Analytical techniques, Water analysis.
Identifiers: *EDTA.

A fast and simple spectrophotometric method for the determination and differentiation of ethylenediaminetetra-acetic acid (EDTA) and nitrilotriacetic acid (NTA) is described. Principles, detection limits and interferences of other recent methods for the analysis of EDTA and NTA are briefly reviewed. The proposed method is based on the light absorption of cobalt (III) complexes of NTA and EDTA at 555 and 535 nm. After the determination of the sum of EDTA and NTA, the NTA complex is selectively oxidized. The absorbance then represents EDTA only. The sensitivity of the method is 10 micrograms; with preconcentration of the water sample by means of rotary evaporation a detection limit of 10 micrograms per liter is observed. (Knapp-USGS)
W74-00295

A SIMPLE TECHNIQUE FOR THE DIFFERENTIATION OF ESCHERICHIA COLI IN WATER EXAMINATION,
Newcastle-upon-Tyne Univ. (England). Public Health Engineering Div.
A. P. Pugsley, L. M. Evison, and A. James.
Water Research, Vol 7, No 10, p 1431-1437, October 1973. 1 fig, 4 tab, 14 ref.

Descriptors: *E. Coli, *Coliforms, *Water analysis, *Analytical techniques, *Bioassay, Bioindicators, Fermentation, Pollutant identification.

New media for the demonstration of gas and indole production in a single tube were compared with other media recommended for use in the 44 deg C confirmatory test for E. coli. The use of mannitol can reduce the numbers of false positive and false negative gas reactions. Indole-production tests may be performed in the same tube as the mannitol fermentation test by including tryptone in the medium. Tryptone mannitol ricinoleate broth and tryptone mannitol broth were most suitable for the confirmation of E. coli in coliform presumptive tubes and membrane filter colonies respectively. The results of the mannitol fermentation and indole-production tests are available within 24 h at 44 deg C. The media are inexpensive and simple to prepare. (Knapp-USGS)
W74-00296

DETECTION OF SALTS OF 2,4-D IN AQUEOUS SOLUTION BY LASTER RAMAN SPECTROSCOPY,
Kentucky Univ., Lexington. Dept. of Electrical Engineering.
J. M. Reeves, E. B. Bradley, and C. A. Frenzel.
Water Research, Vol 7, No 10, p 1417-1429, October 1973. 11 fig, 3 tab, 9 ref.

Descriptors: *2-4-D, *Herbicides, *Spectroscopy, *Pollutant identification, Water analysis, Analytical techniques, Instrumentation.
Identifiers: *Raman spectroscopy, Lasers.

Laser Raman spectroscopy was used to detect a salt of a herbicide, 2,4-dichlorophenoxy acetic acid, in water solution at concentrations as low as 500 ppm. The Raman spectrum of the powder is substantially different from the spectrum of the pollutant in aqueous solution. The spectrum of the potassium and sodium salts are the same for the powder or aqueous solution. Five strong bands exist in aqueous solution, and four of these bands are detectable at concentrations as low as 500 ppm. All spectra were excited with a 50 mW He-Ne gas laser at 6328 A. Lower concentrations should be detectable with a more powerful laser at a higher frequency because: (1) the intensity of the scattered radiation is proportional to the product of the intensity of the electric field perturbing the molecule and the fourth power of the scattered frequency; (2) the attenuation coefficient of water is less; (3) the photocathode used is more efficient at higher frequencies and (4) the monochromator grating used is blazed at 5000 A. The resonance Raman effect is a possible method for the detection and identification of small optimal concentrations of pollutant in water. (Knapp-USGS)
W74-00297

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 2. SOUTH ATLANTIC SLOPE AND EASTERN GULF OF MEXICO BASINS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-00303

SILICA-CARBONATE ALTERATION OF SERPENTINE: WALL ROCK ALTERATION IN MERCURY DEPOSITS OF THE CALIFORNIA COAST RANGES,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02K.
W74-00304

TOXIC MATERIALS ANALYSIS OF STREET SURFACE CONTAMINANTS,
URS Research Co., San Mateo, Calif.
For primary bibliographic entry see Field 05B.
W74-00306

ORGANIC POLLUTANT IDENTIFICATION UTILIZING MASS SPECTROMETRY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
J. M. McGuire, A. L. Alford, and M. H. Carter.
Copy available from GPO Sup Doc as EP1.23/2:73-234, $2.85; microfiche from NTIS as PB-224 544, $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-234, July 1973. 48 p, 11 fig, 5 tab, 14 ref. EPA Project 16ADN25.

Descriptors: *Pollutant identification, *Organic compounds, *Mass spectrometry, *Gas chromatography, Computers, *Data processing, *Organic pesticides, Phenols.
Identifiers: Computer matching, Coal gasification effluent, Synthetic rubber effluent, Pesticide manufacturing effluent.

A system has been developed for the rapid identification of volatile organic water pollutants. It involves computer controlled gas chromatography/mass spectrometry with computerized matching of mass spectra. Application of this system to the analysis of waste effluents revealed a significant number of pollutants that were not previously known to be present. (EPA)

W74-00309

PREPARATIVE FREE-FLOW ELECTROPHORESIS AS A METHOD OF FRACTIONATION OF NATURAL ORGANIC MATERIALS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-00321

A MULTIPARAMETER OIL POLLUTION SOURCE IDENTIFICATION SYSTEM,
Phillips Petroleum Co., Bartlesville, Okla. Research and Development Dept.
J. W. Miller.
Copy available from GPO Sup Doc as EP1.23/2:73-221, $1.85; microfiche from NTIS as PB-224 715, $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-221, July 1973. 173 p, 10 fig, 21 tab, 29 ref. EPA Project 15080 HDJ, 68-01-0059.

Descriptors: *Oil spills, *Chemical analysis, *Chromatography, *Mass spectrometry, Water pollution, Analytical techniques, Tagging, *Pollutant identification, Statistical methods, Oil pollution.
Identifiers: Oil spill identification, Carbon isotopic composition, Sulfur isotopic composition, Statistical identification, *Crude oil sources, n-Paraffin distribution, n-Paraffin odd-even predominance, Odd-even predominance curves, Hydrocarbon GLC profile, Sulfur GLC profile (Fingerprints).

The feasibility of oil pollution source identification is demonstrated on eighty crude oils from the world's major oil fields. Measurements of fifteen diagnostic parameters were made on the 600+F fraction of the crude oil samples. Of the fifteen parameters studied it was demonstrated that six were sufficient to distinguish among the crude oils. These parameters are carbon and sulfur isotopic composition, sulfur, nitrogen, vanadium and nickel contents. A hydrocarbon gas chromatographic profile was also diagnostic for identification but its usefulness was reduced for aged samples by the effect of weathering. The other parameters studied were the saturate, aromatic and asphaltic contents and the carbon isotopic composition of each of these fractions, the n-paraffin distribution (odd-even predominance curves) and the sulfur gas chromatographic profile. The influence of weathering on the parameters was studied. A statistical procedure based on multivariate normal analysis was developed to compare an unknown with a data library and to give an unbiased match of the unknown with a known based on the precision of the measurement methods. (EPA)
W74-00432

BACTERIAL FLAGELLAR UNCOORDINATION AS A MONITOR FOR INDUSTRIAL POLLUTANTS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-00438

THE EXTRACTION OF MERCURY FROM AQUEOUS SOLUTION WITH SULFIDE--TREATED POLYURETHANE FOAM,
Manitoba Univ., Winnipeg. Dept. of Chemistry.
M. A. J. Mazurski, A. Chow, and H. D. Gesser.
Analytica Chimica Acta, Vol 65, No 1, p 99-104, June 1973. 2 fig, 2 tab, 20 ref.

Descriptors: *Mercury, *Separation techniques, *Aqueous solutions, Heavy metals, Water analysis.
Identifiers: *Polyurethane foam, *Methylmercury, Chemical interference, Mercury chloride.

Polyurethane foam treated in an electrical discharge with hydrogen sulfide was shown to be very efficient for separating and concentrating mercury (II) chloride from aqueous solutions over the concentration range 4.0-0.0004 p.p.m. mercury. The foam removed methylmercury (II) chloride from aqueous solutions over the concentration range 2.0-0.0004 p.p.m. methylmercury, but somewhat less effectively. The results were reproducible, and the overall method appears very simple and inexpensive. This method would be very useful for concentrating very low concentrations of mercury from large volumes of water, for aqueous solutions pass easily through the foams at relatively high flow rates. These foams should make useful monitoring devices for mercury levels in industry, in environmental analysis and in the laboratory if quantitative removal of the mercury from the foams can be achieved. Results from Soxhleting the foams with 2 M hydrochloric acid, indicate that quantitative extraction and recovery of the mercury from the foams is possible. The effect of other ions competing against mercury for absorption does not appear to be important when these ions are at the levels generally found in tap water. This procedure is presently being extended to the selective extraction of other metals by the use of various complexing agents on various foams. (Little-Battelle)
W74-00459

THE RAPID DETERMINATION OF THE ORGANOPHOSPHORUS PESTICIDES DIAZINON AND DICHLORVOS IN BLOOD BY GAS CHROMATOGRAPHY,
Ministry of Agriculture, Fisheries and Food, Weybridge (England). Central Veterinary Lab.
A. F. Machin, M. P. Quick, and D. F. Waddell.
Analyst, Vol 98, No 1164, p 176-180, March 1973. 1 fig, 5 tab, 9 ref.

Descriptors: *Diazinon, *Pollutant identification, *Chemical analysis, Methodology, Phosphothioate pesticides, Chlorinated hydrocarbon pesticides, Organophosphorus pesticides, *Gas chromatography, Antihelminthes (Pesticides), Acaricides, Pollutants, Solvent extractions, Separation techniques.
Identifiers: Blood, Thermionic gas chromatography, *Dischlorvos, Chemical recovery, Sample preparation, Detection limits, Body fluids, Biological samples, Animal tissues.

A rapid method for the gas-chromatographic determination of diazinon and dichlorvos in blood is described. Protein is precipitated by mixing the blood with an excess of acetone containing an internal standard and the supernatant liquid is injected, directly or after concentration, into the gas chromatograph. A thermionic phosphorus detector is used. Recoveries are satisfactory from 0.1 ml of blood containing 0.1 ppm of the pesticide without concentration of the extract. If a 1-ml sample is used and the extract concentrated, 0.02 ppm can be determined. It is suggested that the method should be applicable to a wide range of organophosphorus pesticides. The method is also shown to be effective for determining diazinon in tissues and organs, but it is not recommended for this purpose. (Holoman-Battelle)
W74-00460

THE APPLICATION OF THE THIN-LAYER CHROMATOGRAPHIC - ENZYME INHIBITION TECHNIQUE TO ORGANOCHLORINE INSECTICIDES,
Institute of Forensic Research, Krakow (Poland).
M. Bogusz, and T. Borkowski.
Analyst, Vol 98, No 1164, p 190-193, March 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, Methodology, *Pollutant identification, Chemical analysis, *Insecticides, DDT, Heptachlor, Aldrin, Dieldrin, Endrin, *Chromatography.
Identifiers: *Enzyme inhibition technique, *Thin layer chromatography, Detection limits, Enzyme activity, Methoxychlor, p p' DDT, Lindane, Cholinesterase, Carboxylesterase, Enzymatic inhibitors, Esterases.

An investigation was conducted in order to evaluate the possible influence of organochlorine insecticides (active substances and formulations) on results obtained by the thin-layer chromatographic - enzyme inhibition technique and to elucidate the mechanism of such an influence. A modified method of Mendoza et al. (1969) was used with up to 30 micrograms of standards and corresponding formulations being spotted onto the plates. Enzyme (esterase) activity was measured in a dilute liver homogenate. By use of this technique, lindane in amounts of 500 ng or more is detected, whereas the other pesticides tested (p,p'-DDT, ethoxychlor, heptachlor, aldrin, dieldrin, and endrin) remain undetected up to 10 micrograms. Positive results for the tests for organophosphorus and carbamate pesticides with the thin-layer chromatographic - enzymatic technique therefore require corroboration from other tests to exclude the possibility of the presence of lindane. Kinetic enzymatic studies have shown that lindane is a non-competitive inhibitor of carboxylesterase, the predominant enzyme of liver homogenate, which is responsible for the hydrolysis of a chromogenic substrate. Lindane does not inhibit the cholinesterase in liver homogenate. (Holoman-Battelle)
W74-00461

A COMPARISON OF A WET PRESSURE DIGESTION METHOD WITH OTHER COMMONLY USED WET AND DRY-ASHING METHODS,
Colorado Div. Wildlife, Fort Collins.
W. J. Adrian.
Analyst, Vol 98, No 1164, p 213-216, March 1973. 3 tab, 3 ref.

Descriptors: Methodology, *Chemical analysis, *Metals, *Phosphorus, Separation techniques, Chemical degradation, Pollutant identification, Sampling.
Identifiers: *Sample preparation, Biological samples, *Chemical digestion, Wet ashing, Dry ashing, Precision, Hydrogen peroxide, Sulfuric acid, Artemisia tridentata.

A wet-digestion method for the determination of metals and phosphorus in biological material that involves the use of pressure is described and comparisons are made with the standard dry and wet-ashing methods and the sulphuric acid-hydrogen peroxide method. Big sage (Artemisia tridentata) was chosen as the test material. A 500-g sample was ground to a homogenous mixture and twenty-five 0.5-g subsamples were used for each method. The same acid stock was used for each method and all samples were predigested overnight with the exception of those being determined by the dry-ashing and sulfuric acid-hydrogen peroxide methods. The pressure method has the advantage of being able to digest many samples at the same time (to the extent that the cations sought and phosphorus can be extracted into dilute nitric acid) with very little equipment, small volumes of acid and with a low digestion temperature (that of hot tap water), with the precision of more laborious standard methods. (Holoman-Battelle)
W74-00462

DETERMINATION OF ORTHOPHOSPHATE,
Arizona Univ., Tucson. Coll. of Medicine.
R. Huxtable, and R. Bressler.
Analytical Biochemistry, Vol 54, No 2, p 604-608, August 1973. 4 fig, 1 tab, 8 ref.

Descriptors: *Colorimetry, *Phosphates, Assay, *Pollutant identification.
Identifiers: *Sample preparation, *Orthophosphates, Chemical interference.

The Fiske and SubbaRow colorimetric procedure for phosphate determination was modified by Baginski et al. In this method, further color development at the termination of reaction by additional release of phosphate is prevented by using a complexing agent. However, the presence of ATP suppresses color development. To eliminate this problem, the following procedure was developed: 1 ml of 5 percent trichloroacetic acid is added to the sample to be analyzed. Water is added to bring the volume to 3 ml; 0.5 ml of 2.5 percent ammonium molybdate followed by 0.2 ml of 0.2 percent aminonaphthol sulfonic acid (ANSA) are next added. After a 2-min interval, 1 ml of 2 percent sodium citrate and 2 percent sodium arsenite in 2 percent acetic acid is added. The solution is mixed, and left for 15 minutes. Optical density is then read at 750 nm. One micromole of phosphate gives a color reading of 0.736 OD in a 1-cm pathlength cell. (Little-Battelle)
W74-00464

THE CHEMISTRY AND QUANTITATIVE UTILITY OF SODIUM COBALTINITRITE IN THE DETERMINATION OF PHENOLS,
Iowa Univ., Iowa City. Coll. of Pharmacy.
R. V. Smith, and M. J. Garst.
Analytica Chimica Acta, Vol 65, No 1, p 69-75, June 1973. 1 fig, 2 tab, 18 ref.

Descriptors: *Aqueous solutions, *Chemical analysis, Water analysis, Nuclear magnetic resonance, *Phenols.
Identifiers: *p-Cresol, Thin layer chromatography, Atomic absorption spectrophotometry, Ultraviolet spectroscopy, Sample preparation, *Sodium cobaltinitrite.

The reaction of p-cresol with acidified cobaltinitrite has been qualitatively and quantitatively studied. On an analytical scale, the reaction predominantly leads to 2-nitro-p-cresol. The dimer of this compound has also been identified as a minor product. Two methods have been devised for quantitative analysis. The one involves measurement at 366 nm of the 2-nitro-p-cresol formed, after extraction into chloroform. The other employs treatment with sodium hydroxide which causes conversion of 2-nitro-p-cresol to its anion which is measured at 433 nm. The first method is superior in precision and is more rapidly performed. The second provides greater sensitivity and potential selectivity. Both are useful for analyzing p-cresol and may be applicable to other p-substituted phenols. (Little-Battelle)
W74-00465

A SIMPLE PRINCIPLE FOR DOSING APPARATUS IN AQUATIC SYSTEMS,
Umea Univ. (Sweden). Dept. of Ecological Zoology.
For primary bibliographic entry see Field 07B.
W74-00473

SUMMARY OF CHEMICAL AND RADIOCHEMICAL MONITORING OF WATER FOR THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, FISCAL YEAR 1972,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 05B.
W74-00547

5B. Sources of Pollution

CHEMICAL AND BIOLOGICAL CHARACTER OF RIO GRANDE WATER IN THE BOSQUE DEL APACHE WILDLIFE REFUGE,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
For primary bibliographic entry see Field 04A.
W74-00007

NITRATE AND NITRITE VOLATILIZATION BY MICROORGANISMS IN LABORATORY EXPERIMENTS,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 05G.
W74-00008

TRITIUM PRODUCTION.

In: Tritium, p 30-85, May 1973. 25 fig, 9 tab, 66 ref. Messenger Graphics, Pub., Phoenix, Ariz., and Las Vegas, Nev., Price: $35.00.

Descriptors: *Tritium, *Industrial production, *Nuclear powerplants, Radioactivity, *Radioactivity effects, Fallout, Effluents, Nuclear explosions, Nuclear reactors, Nuclear engineering, Safety, Air pollution, Water pollution, Water pollution sources, Soil contamination, Water vapor, Absorption, Population, Environmental effects, Food chains, Absorption, Public health.
Identifiers: *Nuclear detonation, *Thermonuclear fusion, *Fission, Plowshare.

Tritium is formed in both thermonuclear fusion and nuclear fission. Because of its intermediate half-life and biological importance, tritium poses a very special hazard to the world population. The basic mechanisms for generation of tritium in operation of nuclear reactors are reviewed. Long-term buildup of tritium and its management are discussed. Investigations are reported of prediction and measurement of tritium production in reactors. Detonation of nuclear explosives produces substantial amounts of tritium from two sources: the explosive itself and the material and rock surrounding the explosive. The tritium production by a nuclear weapon is closely related to its specific design and to the environment in which it is detonated. The effects of nuclear weapons tests on the tritium inventory can be summarized as follows: (1) The contribution from fission weapons is negligible. (2) The contribution from thermonuclear tests conducted in the atmosphere is large. The present inventory is approximately 45 times the natural background. (3) Underground testing of thermonuclear weapons has not contributed significantly to the atmospheric burden. (Houser-ORNL)
W74-00009

DETECTION AND MEASUREMENT.

In: Tritium, p 86-191, May 1973. 63 fig, 19 tab, 176 ref. Messenger Graphics, Pub., Phoenix, Ariz., and Las Vegas, Nev., Price $35.00.

Descriptors: *Tritium, *Measurement, *Assay, *Monitoring, Air pollution, Water pollution, Soil contamination, Water pollution sources, Fallout, Nuclear explosions, Nuclear powerplants, Regulation, Administrative agencies, Public health.
Identifiers: *Thermonuclear reactors, *Thermonuclear explosions, Fuel reprocessing, Fusion, Plowshare.

The present inventory of tritium is approximately 45 times the natural background and poses a major environmental concern. It has, therefore, established a very strong motivation among scientists to do research for establishment of methods for calibration of tritium standards, its detection and measurement. Various methods are reported for analysis, counting, measuring, and monitoring of tritium. The method of analysis/measurement used depends upon the objective and thus requires a choice of the most suitable of several techniques, using criteria such as the degree of accuracy required, response time, cost of analysis, sample quantities available, etc. Some of the methods are gas counting, enrichment and analysis of low-level tritium samples, monitoring devices, liquid scintillation systems, practical limits of determination, continuous monitoring of aqueous tritium activity, application of emulsions in tritium counting with refrigerated systems, and new procedures for liquid scintillation counting. (Houser-ORNL)
W74-00010

KINETICS OF TRITIUM IN BIOLOGICAL SYSTEMS.

In: Tritium, p 289-381, May 1973. 34 fig, 24 tab, 218 ref. Messenger Graphics, Pub., Phoenix, Ariz., and Las Vegas, Nev., Price: $35.00.

Descriptors: *Tritium, *Kinetics, *Transfer, *Biological communities, Equilibrium, *Radioisotopes, *Radioactivity effects, Air pollution, Water pollution, Soil contamination, Food chains, Public health, Water pollution sources, Nuclear powerplants, Distribution, Invertebrates, Bioindicators, Turnovers, Wastes, Dairy industry, Aquatic animals, Sea water, Absorption, Fish, Ecology.

Various aspects of tritium kinetics in biological systems are reported. First the kinetics and equilibrium isotope effect of tritium substation, the chemical properties of tritium in its reactions, and a conspicuous lack of data on this isotope are reported. Other items of concern are the distribution of tritium between the hydrosphere and invertebrates, biokinetics of environmental tritium, its turnover rates in mammals and desert mammals, excretion in man under tropical conditions and via cow's milk, studies on the food chain contaminated by tritium, biological implications of tritiated luminous compounds, tritiation of aquatic animals, and the behavior of fish chronically exposed to tritium. (Houser-ORNL)
W74-00011

CERTAIN ENVIRONMENTAL ASPECTS OF TRITIUM.
In: Tritium, p 382-495, May 1973. 46 fig, 19 tab, 175 ref. Messenger Graphics, Pub., Phoenix, Ariz., and Las Vegas, Nev., Price: $35.00.

Descriptors: *Tritium, Environment, *Atmosphere, *Sea water, *Soils, Air pollution, Water pollution, Soil contamination, Hazards, Water vapor, Transfer, Food chains, Public health, Radioactivity, Radioactivity effects, Radioecology, Ecosystems, Vegetation, Absorption, Behavior, Model studies, Movement, Water, Climatology.
Identifiers: *Tritiated water.

Tritium existed primarily in the atmosphere and surface waters in small but measurable quantities prior to nuclear bomb testing. However it is estimated to have increased approximately 50-fold as a result of atmospheric weapons testing. The radiological hazard from conversion of tritium to tritiated water in air by metal catalysts is reported. Concern is expressed for additional concentrations of tritium in the environment with additional releases from power reactors, fuel reprocessing plants, and accelerators along with the projected dosage. Some of the major pathways to man are via the food chain from exposures to tritiated water vapor, ingestion and inhalation. The Cumulative Exposure Index (CUEX) concept is being developed to facilitate realistic assessment of the effect of environmental releases of radionuclides. Its concept is explained. The effect of an exposure of the ecological system is described. The transfer of tritium, from methane gas resulting from underground detonation tests, to vegetation is reported. The movement of tritium in soil is being studied by tracer techniques. Water movement in soils under various climatological conditions is being studied through a dynamic model. (Houser-ORNL)
W74-00012

ENVIRONMENTAL MONITORING TECHNIQUES.

In: Tritium, p 496-556, May 1973. 36 fig, 12 tab, 54 ref. Messenger Graphics, Pub., Phoenix, Ariz., and Las Vegas, Nev., Price: $35.00.

Descriptors: *Monitoring, *Tritium, *Measurement, *Assay, *Regulation, Safety factors, Air pollution, Water pollution, Water pollution sources, Effluents, Environment, Aquatic environment, Analytical techniques, Instrumentation, Methane, Natural gas, Krypton, Radioisotopes.

Monitoring for tritium may be done for two reasons. The first is to measure releases to maintain acceptable levels, and the second serves as a check against possible mechanical failures. Various ways of monitoring for tritium are discussed. These methods are concerned with measuring tritium in water and air effluents, laboratory systems for tritium analysis of large numbers of environmental samples, and monitoring of tritium in the aquatic environment. Analytical quality control of analyses of tritium in water may be achieved through intercomparison studies. A sampler for nonaqueous tritium gases is described. Also described is a tritium stack monitor having a wide digital range. An on-line monitor for natural gas from nuclear stimulation provides a fast and accurate method for measuring tritium and krypton-85 in natural gas. (Houser-ORNL)
W74-00013

CAPACITIES OF SHALLOW WATERS OF SAGAMI BAY FOR OXIDATION AND REDUCTION OF INORGANIC NITROGEN,
Tokyo Univ. (Japan). Ocean Research Inst.
T. Miyazaki, E. Wada, and A. Hattori.
Deep-Sea Research and Oceanographic Abstracts, Vol 20, No 6, p 571-577, June 1973. 4 fig, 3 tab, 18 ref.

Descriptors: *Nitrogen, Shallow water, *Sea water, *Radioactivity techniques, *Oxidation, *Reduction (Chemical), *Path of pollutants, Inorganic compounds, Nitrites, Nitrates, Ammonia, Absorption, Chemical analysis, Water analysis, Tracers, Methodology, Water sampling, Mass spectrometry, Pollutant identification.
Identifiers: *Japan (Sagami Bay), N-15, Coastal waters, Fate of pollutants, Chemical recovery, Kjeldahl procedure.

The distribution of nitrite, nitrate and ammonia in Sagami Bay, Japan, was investigated on Cruises KT-70-5 and KT-70-13 of the R.V. Tansei Maru. The purpose was to estimate the capacity of coastal waters for the oxidation and reduction of inorganic nitrogen by measuring the incorporation of N-15 into nitrite from N-15-labeled ammonia and nitrate. N-15-labeled ammonia, nitrite or nitrate was added at 10 microgram-atoms N/l concentrations to water samples in glass bottles some of which were incubated in the sunlight or in the dark. N assimilation was measured on filtered residues by Kjeldahl digestion. N-15 incorporation into nitrite was determined using azo dyes along with Kjeldahl digestion and N-15 content by mass spectrometry. Chemical analyses for nitrate, nitrite and ammonia were carried out by previously described methods. In summer, the maximum concentration of nitrite (about 0.3-microgram atoms N/l in central Sagami Bay) occurred at 20-30 m depth and was associated with a seasonal thermocline. In winter, the concentrations of nitrite were nearly constant (about 0.3-microgram atoms N/l) from the surface down to about 100 m; below that depth they decreased. The potential activities for nitrite production from nitrate ammonia were measured, using a N-15-tracer method. The activity for nitrite production from nitrate was of the same order of magnitude as that from ammonia (1.4 ng atoms N/l./hour, on an average), irrespective of the season. The capacities for assimilation of inorganic nitrogen in the upper layers (0-50 m) were several times higher than those for the oxidation of ammonia and the reduction of nitrate, but a reverse relation was observed below the euphotic zone. The residence time of nitrite in the upper layers was 7-16 days. (Holoman-Battelle)
W74-00047

THE ENVIRONMENTAL FATE OF STRANDED CRUDE OIL,
Woods Hole Oceanographic Institution, Mass.
M. Blumer, M. Ehrhart, and J. H. Jones.
Deep-Sea Research and Oceanographic Abstracts, Vol 20, No 3, p 239-259, March 1973. 5 fig, 6 tab, 11 ref.

Descriptors: *Environmental effects, *Weathering, *Oil spills, Persistence, Aging (Physical), Chemical analysis, Gas chromatography, Microbial degradation, Chemical degradation, Oil pollution, Fossil fuels, *Massachusetts, Water pollution.
Identifiers: *Fate of pollutants, *Crude oil, n-Paraffins, n-Alkanes, Liquid chromatography, Infrared spectrophotometry, Infrared spectra, Petroleum residues, Boiling point, Bermuda, *Martha's Vineyard (Mass), Wax, Marine environment.

The weathering history of two light paraffinic crude oils which stranded on Martha's Vineyard, Massachusetts, and on Bermuda has been studied over periods of 13 1/2 and 16 months, respectively. The evaporative history of the oils, the microbial utilization of the normal alkanes and other physical and chemical changes involved in the weathering process are described. Oil samples collected from each site were analyzed on temperature-programmed gas chromatographs with 3 percent Apiezon L on Chromosorb W columns. Other analyses included infrared spectrophotometry, liquid chromatography, and ultraviolet analysis. At both locations a considerable and environmentally important fraction of the oil has persisted throughout the entire survey period. The residues are far from being inert asphalts; they remain crude oils, modified by evaporation of the lower boiling components and by partial microbial degradation. The environmental impact of spilled oil depends directly on the magnitude of the standing crop of fossil fuels and on the retention during weathering of specific biologically active oil components. This work demonstrates an unanticipated degree of persistence of oil and of its high boiling components, even under conditions thought favorable to weathering. Wax aggregates in one of the oils suggest that it was derived from tank washings. A survey for wax in open ocean 'tar' should give insight into its sources and the effectiveness of measures to control oil pollution. (Holoman-Battelle)
W74-00049

PHOTODECOMPOSITION OF THE HERBICIDE METHAZOLE,
Kentucky Univ., Lexington. Dept. of Entomology.
G. W. Ivie, W. Dorough, and R. A. Cardona.
Journal of Agricultural and Food Chemistry, Vol 21, No 3, p 386-391, May/June 1973. 3 fig, 2 tab, 6 ref.

Descriptors: *Herbicides, *Pollutant identification, *Pesticide toxicity, *Water analysis, Chlorinated hydrocarbon pesticides, Ultraviolet radiation, Solar radiation, Water, Radioactivity techniques, Chemical analysis, Degradation (Decomposition), Urea pesticides, Mass spectrometry, Methodology, Isolation, Phytotoxicity, Water pollution.
Identifiers: *Photodecomposition, *Methazole, *Metabolites, Degradation products, Photoisomers, Sample preparation, Photodegradation, 3 4-Dichloronitrobenzene, Methanol, Proton magnetic resonance, 1- (3 4-Dichlorophenyl)-3-methylurea, 1- (3 4-Dichlorophenyl)urea, Infrared spectrophotometry, Dichloro-1-methyl-2-benzimidazolinone, PMR spectra, Infrared spectra, 1- (3 4-Dichlorophenyl)-3-methoxymethylurea, 2- (3 4-Dichlorophenyl)-4-methyl-1 2 4-oxadiazolidine-3 5-dione, Mass spectra.

Exposure of methazole (2- (3,4-dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3-5-dione) to ultraviolet light in methanol or to sunlight in water or as surface deposits resulted in loss of carbon dioxide from the oxadiazolidine ring with subsequent generation of several derivatives. Photoproducts identified include 3,4-dichloronitrobenzene, 1-(3,4-dichlorophenyl)-3-methylurea, 1- (3,4-dichlorophenyl)urea, and two isomeric dichloro-1-methyl-2-benzimidazolinones. The methylurea and urea compounds were not produced in methanol, but 1- (3,4-dichlorophenyl)-3-methoxymethylurea was generated in rather large quantities. This compound degraded to the urea during workup of the photolysis mixture. The two isomeric dichloro-1-methyl-2-benzimidazolinone photoproducts were not phytotoxic to bean or tomato foliage, but were more toxic to mice than methazole when administered ip. (Holoman-Battelle)
W74-00050

INORGANIC AND ORGANIC PHOSPHORUS DISTRIBUTION IN DOMESTIC AND MUNICIPAL SEWAGE,
Saskatchewan Univ., Saskatoon. Dept. of Soil Science.
P. M. Huang, and C. P. Hwang.
Water and Sewage Works, Vol 120, No 6, p 82-83, June 1973. 1 tab, 7 ref.

Descriptors: *Phosphorus, *Domestic wastes, *Municipal wastes, *Distribution, *Pollutant identification, Sewage, Suspended solids, Dissolved solids, Filtration, Nutrient removal, Distillation, Nutrients, Separation techniques, Methodology.
Identifiers: *Organic phosphorus, Colloidal solids, Membrane filters, Cellulose membranes.

A domestic sewage sample and a municipal sewage sample were examined to determine the distribution of inorganic phosphorus in different size fractions of sewage. Fractionation was carried out by cellulose membrane filtration. Before fractionation, total P, inorganic and organic P content was determined in the less than 3-micron suspension and in the less than 0.025-micron suspension. The amount of total, inorganic and organic phosphorus in sewage decreases with successive filtrations through different size millipore membranes. The percent distribution of total phosphorus in the greater than 3-micron solids, 0.025-3-micron solids and less than 0.025-micron suspension of the samples ranges from 29-40, 5-7 and 53-66, respectively. These separations roughly correspond to suspended solids, colloidal solids and dissolved solids. The percent distribution of inorganic phosphorus in the respective fractions ranged from 19-29, 0-8 and 63-81; that of organic phosphorus ranged from 56-72, 7-17 and 21-27 percent. Inorganic phosphorus was relatively concentrated in the less than 0.025-micron suspension, but it was also present in considerable amount in the greater than 3-micron solids. In contrast to inorganic phosphorus, the content of organic phosphorus in the greater than 3-micron solids was two to more than three times higher than that in the less than 0.025-micron suspension. The total organic phosphorus removed by the filtration with 3-micron and 0.025-micron membranes ranged from 73-79 percent. (Holoman-Battelle)
W74-00055

EFFECTS OF PH, LIGHT AND TEMPERATURE ON CARBARYL IN AQUEOUS MEDIA,
Oregon State Univ., Corvallis. Environmental Health Sciences Center.
R. D. Wauchope, and R. Haque.

Bulletin of Environmental Contamination and Toxicology, Vol 9, No 5, p 257-260, May 1973. 1 tab, 11 ref.

Descriptors: *Degradation (Decomposition), *Aqueous solutions, Hydrogen ion concentration, Mass spectrometry, Hydrolysis, Solar radiation, *Carbamate pesticides, Volumetric analysis, Chromatography, Sea water, Solubility.
Identifiers: *Carbaryl, Thin layer chromatography, Fate of pollutants, Photooxidation, 1-Naphthol, 2-Hydroxy-1 4-naphthoquinone, Lawsone, *Photodegradation.

Degradation of carbaryl in aqueous media was observed under several conditions. The rate of consumption of base was observed using a Radiometer syringe titrator in the pH-stat mode. A 95 percent solution of recrystallized carbaryl was added to distilled water with a pH of 9.0-10.0 for the experiments. Reaction times and second-order rate constants were obtained. Hydrolyses were run in a dark amber glass bottle immersed in water and with temperature and pH closely controlled. A xenon-arc lamp was used to simulate solar radiation of basic solutions of carbaryl in the cavity of a spectrometer. Products were analyzed by mass spectroscopy and thin-layer chromatography. The results show that there is little difference in carbaryl hydrolysis rate constants in NaOH solution vs. seawater. Solubilities of carbaryl were 114 ppm at 24C and 67 ppm at 12C based upon titration rates. In weakly acid solutions, carbaryl and 1-naphthol were stable for weeks in the dark and under laboratory light. Base hydrolysis of carbaryl in the dark leads to formation of 1-naphthol as the only naphthyl product. However, basic 1-naphthol or hydrolyzed carbaryl-solutions turn yellow then amber under laboratory light. Thus, it is the basic form of 1-naphthol, 1-naphthoxide ion, which appears to be especially light sensitive, and photodegradation of this species is probably the most important route for further changes. Products identified in irradiated samples were 1-naphthol and 2-hydroxy-1,4-naphthoquinone (lawsone). (Little-Battelle)
W74-00056

STUDIES IN SWEDEN ON FEASIBILITY OF SOME METHODS FOR RESTORATION OF MERCURY-CONTAMINATED BODIES OF WATER,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 05G.
W74-00060

A REVIEW OF OUTBOARD MOTOR EFFECTS ON THE AQUATIC ENVIRONMENT,
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W74-00063

SOME CONSIDERATIONS OF THE CHEMICAL LIMNOLOGY OF MEROMICTIC LAKE MARY,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05C.
W74-00064

NOXIOUS SUBSTANCES CONTAINED IN THE WATERS: THEIR ORIGIN, BEARING, AND THEIR ELIMINATION, (IN GERMAN),
Mainz Univ. (West Germany). Hygiene Institut.
J. Borneff.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 155, No 3, p 220-230, 1971. English summary.
Identifiers: *Germany, Human wastes, Nitrates, *Noxious substances, Reviews, Sewage, Water pollution control, Path of pollutants, Water purification.

Past efforts to control water pollution in Germany are reviewed. Communities and industry are mainly responsible for the major part of water pollution. Both currently discharge insufficiently or non-purified sewage into lakes and rivers. Immediate measures for ground-water protection (marking of protection zones, prevention of accumulation of nitrates) must be taken to ensure perfect quality of drinking water prepared from surface water (general introduction of proved conditioning methods, supplementation of analytic control examinations for trace substances) and for protection of allround hygienic quality of the surface water (erection of clarification plants). The prevalence and effects of the various noxious substances must be studied to determine specific preventive directions and regulations. Noxious substances known to be particularly hazardous must be replaced by other compounds.--Copyright 1973, Biological Abstracts, Inc.
W74-00065

INTERACTION OF YELLOW ORGANIC ACIDS WITH CALCIUM CARBONATE IN FRESHWATER,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
A. Otsuki, and R. G. Wetzel.
Limnology and Oceanography, Vol 18, No 3, p 490-493, May 1973. 2 fig, 1 tab, 18 ref.

Descriptors: *Calcium carbonate, Freshwater, *Organic matter, *Separation techniques, *Chemical precipitation, Humic acids, Organic acids, Adsorption, Chemical reactions, Pollutants, Hydrogen ion concentration, Hardness (Water), Methodology, Chemical analysis, Water analysis.
Identifiers: *Yellow humic acids, Chemical recovery, Sample preparation.

That refractory dissolved organic matter can be removed naturally from lake waters as CaCO3 precipitates has been examined. Adsorption experiments involving yellow humic acids were done by inducing CaCO3 precipitation from homogenous systems. Carbon-14 yellow acids were prepared from the experimental decomposition of a C-14-labeled aquatic plant (Scirpus subterminalis). Experimental water was collected from the mouth of an inlet stream which dominates the total monthly Ca ion input to Lawrence Lake throughout the year. More than 30 percent of yellow acids were removed from solution along with CaCO3 precipitation. The pH of each solution increased with time from the initial 8.4 to 9.0-9.1, suggesting that CaCO3 precipitation occurred with the release of CO2 from Ca (HCO3)2 rather than as the result of supersaturation of CaCO3. The results show that large amounts of soluble humic substances are removed from lake water with CaCO3. It was found that the yellow acids behave like lipid material with respect to association with CaCO3 particles. (Holoman-Battelle)
W74-00068

ORGANOCHLORINE INSECTICIDE RESIDUES IN STREAMS DRAINING AGRICULTURAL, URBAN-AGRICULTURAL, AND RESORT AREAS OF ONTARIO, CANADA - 1971,
Department of Agriculture, London (Ontario). Research Inst.
J. R. W. Miles, and C. R. Harris.
Pesticides Monitoring Journal, Vol 6, No 4, p 363-368, March 1973. 2 fig, 3 tab, 6 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Drainage water, *Pollutant identification, *Pesticide residues, Insecticides, Chemical analysis, Bottom sediments, Urban runoff, Agricultural runoff, Recreation wastes, Drainage area, Pollutants, Water analysis, DDT, DDD, DDE, Dieldrin, Endrin, Heptachlor, Aldrin, Insecticides, Gas chromatography, Solvent extractions, Brown trout, Rainbow trout, Rock bass, Carp, Bass, Lake trout, Cisco.
Identifiers: Electron capture gas chromatography, Trace levels, Chemical recovery, Sample preparation, Biological magnification, Animal tissues, Bioaccumulation, TDE, Endosulfan, gamma-Chlordane, Lindane, Heptachlor epoxide, Muskoka River, Muskoka Lakes, Thames River, Gas liquid chromatography, Animal tissues, Bluegills, Salmo trutta, Salmo gairdneri, Ambloplites rupestris, Cyprinus carpio, White sucker, Catostomus commersoni, Salvelinus namaycush, Aroclor 1254, Chemical interference, Coregonus artedii, *Canada (Muskoka River).

Organochlorine insecticide residues in water systems draining agricultural, urban-agricultural, and resort areas of Ontario, Canada, were compared by analysis of water, bottom mud, and fish, collected during the period from mid-April to mid-October 1971. Insecticides detected by electron capture gas chromatography were p,p'-DDT, o,p-DDT, p,p'-TDE, o,p'-TDE, p,p'-DDE, gamma-chloradane, dieldrin, endrin, endosulfan, heptachlor, heptachlor epoxide, lindane, and aldrin. Insecticide concentrations in water from all three areas were less than the 'Maximum Reasonable Stream Allowances' for growing fish that are safe for human consumption. The concentrations of total DDT in the water were combined with water flow data to calculate the weekly rate of transport of total DDT at each sampling time. The greatest transport of total DDT was by the Muskoka River which drains the Muskoka Lakes resort area where DDT was used until 1966 for control of biting flies; a peak of 11.8 lb total DDT per week was recorded in May, but this transport quickly lessened, resulting in a May to October average of 1.9 lb total DDT per week. Corresponding figures for the Thames River (urban-agricultural) were peak 2.5 lb and average 0.4 lb total DDT per week and for Big Creek (agricultural), peak 0.5 lb and average 0.2 lb per week. The ratio of concentration of total DDT in mud to total DDT in water was as great as 800; total DDT in fish to total DDT in water was as great as 1 million. The ratio of p,p'-TDE to p,p'-DDT was less than 1 in water but greater than 1 in bottom mud, indicating possible dechlorination of p,p'-DDT to p,p'-TDE in the bottom mud. Polychlorinated biphenyls (PCB's) were present in the urban-agricultural area samples of bottom mud and fish at levels up to 217 ppm and about 0.4 ppm, respectively. (Holoman-Battelle)
W74-00070

RATE OF EVAPORATION OF LOW-SOLUBILITY CONTAMINANTS FROM WATER BODIES TO ATMOSPHERE,
Toronto Univ. (Ontario). Dept. of Chemical Engineering and Applied Chemistry.
D. Mackay, and A. W. Wolkoff.
Environmental Science and Technology, Vol 7, No 7, p 611-614, July 1973. 1 tab, 17 ref.

Descriptors: *Evaporation, Rates, *Pollutants, Bodies of water, *Mathematical studies, *Forecasting, *Aqueous solutions, Solubility, Equations, Mercury, Aquatic environment, Methodology, Diffusion, Pesticides, Polychlorinated biphenyls, Vapor pressure, Heavy metals, DDT, Dieldrin, Aldrin, Aromatic compounds, Organic compounds, Water pollution, Air pollution, *Path of pollutants.
Identifiers: *Hydrocarbons, *Chlorinated hydrocarbons, Desportion, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260, Lindane, Alkanes, n-Octane, 2 2 4-Trimethylpentane, Aromatic hydrocarbons, Aliphatic hydrocarbons, Benzene, Toluene, o-Xylene, Cumene, Naphthalene, Fate of pollutants.

Equations are derived to predict the rate of evaporation from aqueous solutions of compounds such as hydrocarbons and chlorinated hydrocarbons which are of low solubility. The rate of evaporation can be high even for compounds of low vapor pressure and 'half lives' in solution can

be as low as minutes or hours under laboratory or environmental conditions. The rate may be limited by diffusion or desorption. Transfer of contaminants from the water to air environments may thus occur much faster than has been generally appreciated. (Holoman-Battelle)
W74-00071

BASELINE CONCENTRATIONS OF LIGHT HYDROCARBONS IN GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Oceanography.
J. M. Brooks, A. D. Fredericks, W. M. Sackett, and J. W. Swinnerton.
Environmental Science and Technology, Vol 7, No 7, p 639-642, July 1973. 5 fig, 2 ref.

Descriptors: Surface waters, *Gulf of Mexico, *Baseline studies, *Sea water, Water analysis, Water quality, *Pollutant identification, Organic compounds, Gases, Methane, Chemical analysis, *Gas chromatography, Water pollution sources.
Identifiers: *Hydrocarbons, Marine environment, Flame ionization gas chromatography.

A 2500-mile survey of light hydrocarbon concentrations in surface water of the Gulf of Mexico was conducted to determine baseline concentrations for a program to identify problems related to oceanic environmental quality. Analyses of the light hydrocarbons were carried out by flame ionization gas chromatography. High concentrations seem to be associated solely with man's activities in the vicinity of ports and offshore petroleum drilling and production operations and in one case on the high seas, near a tanker reportedly discharging 'clean ballast water'. (Holoman-Battelle)
W74-00073

GROUND-WATER NITRATE POLLUTION IN RURAL AREAS,
Illinois State Water Survey, Urbana.
W. H. Walker.
Ground Water, Vol 11, No 5, p 19-22, September-October 1973. 2 fig, 3 ref.

Descriptors: *Path of pollutants, *Nitrates, *Groundwater, Farm wastes, Fertilizers, Waste disposal, Groundwater movement.

In humid regions, chemical pollutants such as nitrate readily enter surficial aquifers as slugs during recharge periods in the nongrowing season and move slowly through the aquifer to nearby drainage tiles, streams, or pumping wells. Little mixing with native groundwater seems to occur, and for this reason, fairly small quantities of pollution may enter a well as a high-concentration slug long after its initial entry into the aquifer. Nitrate slug concentrations in excess of 6,000 ppm have been delineated in one surficial aquifer in Illinois. Trees and plants may temporarily store large quantities of nutrients during the growing season for release to aquifers during subsequent nongrowing seasons. Considering this, it appears imperative that farm fertilizer application and waste disposal on farmlands be limited to the growing season and only in quantities that will not ultimately cause groundwater nitrate concentrations to rise above toxic levels. (Knapp-USGS)
W74-00095

A MODEL FOR CHEMICAL EXCHANGE IN THE BASALT-SEAWATER SYSTEM OF OCEANIC LAYER II,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 02K.
W74-00097

POLLUTION OF AIR, WATER, AND SOIL BY LIVESTOCK,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 05G.
W74-00128

CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF,
Agricultural Research Service, Lincoln, Neb.
For primary bibliographic entry see Field 05G.
W74-00131

POLLUTION OF AIR, WATER AND SOIL BY LIVESTOCK,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 05G.
W74-00135

CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 05G.
W74-00138

NITROGEN SOURCES AND CYCLING IN NATURAL WATERS,
Florida Univ., Gainesville. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 05C.
W74-00149

OCCURRENCE AND DISTRIBUTION OF HELMINTH PARASITES OF FISHES FROM LAKE CARL BLACKWELL, OKLAHOMA,
Oklahoma State Univ., Stillwater.
R. D. Spall.
Available from the National Technical Information Service as COM-72-11082, $3.00 in paper copy, $1.45 in microfiche. M.S. thesis supported by National Marine Fisheries Service, Report NOAA-72070613, July 1968. 108 p, 6 fig, 20 tab, 179 ref. 4-24-R.

Descriptors: *Fish parasites, *Hosts, *Worms, Fish, Fish diets, Systematics, Distribution, Nematodes, Trematodes, *Oklahoma.
Identifiers: *Helminths, Lake Carl Blackwell (Okla), South Central U.S.

The endoparasitic helminths of fishes in Lake Carl Blackwell, Oklahoma, were surveyed, and to what degree certain environmental factors can be correlated with variations in the prevalence and intensity of parasitism determined. Channel catfish (Ictaluras punctatus) and white crappie (Pomoxis annularis), because of constant availability, were selected for analysis together with other fish species collected during summer. The incidence and intensity of fish infection with helminth parasites varied considerably among different hosts. Certain habitat features such as high turbidity and absence of aquatic macrophytes probably limited many Trematoda. Host age appears to have far-reaching effects on parasitism in natural infections. Physiological and immunological changes resulting from the aging process appeared to influence their helminthocenoses. The most obvious changes are those associated with gonadal development and sexual maturity. Data seem to show that ontogenic changes in the feeding behavior of the host are perhaps even more important. Seasonal variation in incidence and severity of helminth parasitism, especially those utilizing fish as definitive hosts, was probably influenced by the annual life cycle of the parasite. Changing food habits of the host has been cited to explain observable differences in its helminth fauna. (Jones-Wisconsin)
W74-00230

SOIL DENITRIFICATION IN SEALED SOIL--PLANT SYSTEMS: I. EFFECT OF PLANTS, SOIL WATER CONTENT AND SOIL ORGANIC MATTER CONTENT,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
For primary bibliographic entry see Field 02G.
W74-00237

HYGIENIC EFFICACY OF SANITARY PROTECTION MEASURES FOR SURFACE WATERS IN THE REGION OF OIL-REFINING AND OIL-CHEMICAL ENTERPRISES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny i Profzabolevanii, Ufa (USSR).
F. G. Murzakaev.
Gig Sanit. Vol 37, No 7, p 15-18. 1972. (English summary).
Identifiers: *Chemical wastes, Hygienic protection, *Oil wastes, *Sanitary protections, Surface waters, Industrial wastes, *USSR (Belaya River).

A complex of sanitation measures (technologic, sanitary-technical, organizational, etc.) was carried out by oil-refining and oil-chemical enterprises of a large industrial center for the sanitary protection of surface waters. Consequently, down current of the river Belaya, a significant fall in contamination was noted at the water uptake sites for the municipal water supply. Further sanitation measures should stipulate a more intense decontamination of sewage containing oil and organic substances by local and biological treatment installations. In such cases after biological decontamination, the effluents should undergo a number of additional treatments to diminish the concentration of residual organic and cancerogenic compounds.--Copyright 1973, Biological Abstracts, Inc.
W74-00241

NITRATE CONTENT OF WELL WATER IN WEST-CENTRAL WISCONSIN,
Wisconsin Univ., River Falls.
M. W. Wehking, J. W. Pavlik, P. Strege, and D. Gilles.
Wisconsin Academy of Sciences, Arts and Letters, Vol 61, p 259-265, 1973. 1 fig, 4 tab, 11 ref.

Descriptors: *Potable water, *Water pollution sources, *Nitrates, *Wells, *Wisconsin, Depth, Limestones, Groundwater, Spectrophotometry, Fertilizers, Coliforms, Water analysis.
Identifiers: Pierce County (Wis.), St. Croix County (Wis.).

Concern over nitrate content of drinking water, particularly from groundwater sources, prompted survey of wells in Pierce and St. Croix Counties, Wisconsin. Nitrate content of 124 wells was determined. None of the well water samples contained iron sufficient to affect analysis. Nitrate content of these wells varied widely, the majority containing concentrations of less than 20 ppm. Twenty of the wells (16.5%) yielded water containing nitrate in excess of 45 ppm. The data acquired from those wells for which depths were known were examined for relationship between well depth and nitrate content. Although the correlation was not perfect, the summarized data indicate that as well depth increased, the average nitrate content decreased. In areas underlain by limestone, faults in the subterranean structure allow surface water to reach depths of several hundred feet quite rapidly. No conclusions were reached from the results as to origin of nitrate in ground water. However, greater probability exists of finding excessive quantities of nitrate beyond 45 ppm. in shallow wells less than 150 ft than in deep wells greater than 150 ft. (Jones-Wisconsin)
W74-00246

ISOMERIZATION OF GAMMA-BHC TO ALPHA-BHC IN THE ENVIRONMENT,
Wisconsin Univ., Madison. Dept. of Entomology.
H. J. Benezet, and F. Matsumura.
Nature, Vol 243, No 5408, p 480-481, June 22, 1973. 1 fig, 10 ref.

Descriptors: *Microbial degradation, *Sediments, *Metabolism, Cultures, Gas chromatography, Separation techniques, Soil bacteria.

Identifiers: *Benzene haxachloride, *Isomerization, Pseudomonas putida, Lindane, Fate of pollutants, Isomers, Alpha-benzene hexachloride, Gamma-benzene hexachloride, Degradation products, Metabolites, Gamma-pentachlorocyclohex-l-ene, Gamma-tetrachlorocyclohex-l-ene.

To study the metabolic fate of gamma-BHC in the environment, a highly purified form of the compound was incubated with aquatic sediments under simulated natural conditions and with a soil microorganism under laboratory conditions. For the first test, the gamma-BHC was added to sediments from Pearl Harbor, placed in a medicine bottle which was then filled with seawater and sunk to the bottom at the collection site for 30 d. At the end of the period, the sediment was extracted and the extract analyzed by GC. Alpha-BHC was present in quantities 4 times that found in the original quantity of gamma-BHC. Total recovery of the gamma isomer from the sediment was 40 percent. For the laboratory study, a strain of Pseudomonas putida in a mannitol base medium was incubated with gamma-BHC and NAD for 4 weeks. Concurrently small-scale experiments were conducted with C-14-labelled BHC and P. putida with and without NAD. In the culture tests with NAD, 40 times as much alpha-BHC was present as originally. With the C-14-labelled BHC, P. putida was found to produce gamma-PCCH (gamma-pentachlorocyclohex-l-ene) from gamma-BHC, but was capable of producing alpha-BHC with NAD present. Another metabolic product of alpha-BHC production was gamma-BTC (gamma-tetrachlorocyclohex-l-ene). It is concluded that microorganisms in the environment may isomerize gamma-BHC to alpha-BHC. (Little-Battelle)
W74-00264

ASSOCIATION OF HYDROCARBONS AND MINERAL PARTICLES IN SALINE SOLUTION,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
P. A. Myers, and J. G. Quinn.
Nature, Vol 244, No 5410, p 23-24, July 6, 1973. 3 tab, 11 ref.

Descriptors: *Sediments, *Adsorption, *Clays, Illite, Montmorillonite, Bentonite, Oil spills, Path of pollutants, Toxicity, Water pollution effects, Organic matter, Solubility, Sea water, *Rhode Island, *Organic compounds.
Identifiers: *Fuel oil, Eicosane, Hexadecane, Anthracene, Phenanthrene, Fate of pollutants, Heat of sorption, n-Alkanes, Branched alkanes, Isoprenoid hydrocarbons, Aromatic hydrocarbons, Naphthalenic hydrocarbons, *Narragansett Bay (R.I.).

Bentonite clay or marine sediments from Narragansett Bay were added to saline solutions containing hydrocarbons (eicosane, Hexadecane, anthracene, phenanthrene, or fuel oil) dissolved in acetone to study the sorption of hydrocarbons on the minerals. The marine sediments were tested with and without organic matter separated. The heats of sorption of eicosane and anthracene onto bentonite clay indicated physical absorption to be of the van der Waals type. The results of the sorption tests show that hydrocarbon solubility affects uptake and retention of fuel oil by marine sediments and that organic matter in sediments reduces the incorporation of fuel oil into the sediment samples investigated. Although the compounds are firmly associated onto the mineral particles, they may be slowly released by biological activity and dissolution. If dissolution were dominant, the more polar hydrocarbons, which are toxic, would be released more readily and could impose a continuing stress on marine organisms long after visual evidence of oil production has disappeared. (Little-Battelle)
W74-00265

THE INFLUENCE OF AN INDUSTRIAL PLANT ON THE CHEMISTRY OF QUATERNARY WATERS IN ITS VICINITY, UPPER ODRA RIVER VALLEY, (IN POLISH),
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
For primary bibliographic entry see Field 05A.
W74-00266

DEGRADATION OF PARATHION IN FLOODED ACID SOILS,
Central Rice Research Inst., Cuttack (India).
N. Sethunathan.
Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 602-604, July/August 1973. 1 fig, 4 tab, 9 ref.

Descriptors: *Insecticides, *Phosphothioate pesticides, *Acidic soils, *Chemical degradation, *Pesticide residues, *Microbial degradation, Soil bacteria, Hydrolysis, Soil analysis, Laterites, Saline soils, Alluvium, Biodegradation, Degradation (Decomposition), Organophosphorus pesticides, Solvent extractions, Methodology, Isolation, Chemical analysis, Soil contamination.
Identifiers: *Parathion, Flooded conditions, Degradation products, p-Nitrophenol, Chemical recovery, Metabolites, Bacillus, Sample preparation, Thin layer chromatography.

The persistence of parathion (0,0-diethyl 0- (p-nitrophenyl) phosphorothioate) in five acid soils under flooded conditions was investigated. Parathion residues were prepared for analysis by thin-layer chromatography by extraction with 1:1 chloroform-diethyl ether, evaporation to dryness and dissolution in methanol. To determine if the degradation in acid sulfate soil were biological or chemical, parathion dissolved in ethanol was added to autoclaved and nonautoclaved soils which were in turn flooded with sterile distilled water. The standing water of alluvial soil which exhibited hydrolytic activity after 3 additions of parathion was analyzed for biological or chemical hydrolysis. The insecticide degraded faster in soils which had a higher organic matter content. Fastest degradation occurred in an acid sulfate soil with an organic matter content of 12.2 percent, apparently due to microbial participation. Repeated additions of parathion to an alluvial soil enhanced its hydrolysis to p-nitrophenol. Heat treatment of the parathion-hydrolyzing enriched culture from the alluvial soil retarded its activity, indicating the role of biological agents in the hydrolysis. A Bacillus sp capable of readily decomposing p-nitrophenol as a sole carbon source was isolated from parathion-amended flooded alluvial soil. (Holoman-Battelle)
W74-00268

BIODEGRADABILITY OF NONIONIC SURFACTANTS: SCREENING TEST FOR PREDICTING RATE AND ULTIMATE BIODEGRADATION,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
R. N. Sturm.
Journal of the American Oil Chemists' Society, Vol 50, No 5, p 159-167, May 1973. 12 fig, 29 ref, 1 append.

Descriptors: *Surfactants, Carbon dioxide, Methodology, *Microbial degradation, Chemical reactions, Laboratory equipment, *Biodegradation, *Detergents.
Identifiers: *Nonionic detergents.

A method based on conversion to CO2 and H2O has been developed for determining biodegradability characteristics of non-ionic surfactants. The screening test consists of the Thompson-Duthie CO2 test scaled down from 20 to 6 liters, and a biochemical oxygen demand test performed with acclimated sewage-derived microorganisms. The CO2 test apparatus is arranged in such a manner that eight materials and a positive control may be tested simultaneously. Nine individual acclimation cultures-each combining settled raw sewage as a source of microorganisms, yeast extract as an easily assimilatible nutrient source, BOD water as a diluent and source of inorganic nutrients, and a test material for 14 days. At the end of that time, equal aliquots from each of these cultures are used to make a composite seed for use in the CO2 test. The final composition in each carboy includes 600 ml of composite seed and 120 mg of a test material brought to a total of 6 liters with BOD water. During the test CO2-free air is bubbled through the test units and the effluent gas is passed through a series of CO2 absorbers containing barium hydroxide. Periodically, the proximal absorber is removed for titration. The test is continued for a period of 26 days. At day 25, the test vessels are acidulated to pH 3.0 in order to release CO2 that may be trapped in the medium. A wide range of nonionic surfactants have been screened for biodegradability by this method, and the results, in general, correlate well with those of other investigators. These have included studies of the effect of hydrophobe chain length, ethoxylate chain length, and the presence of phenolic groups on biodegradability. The method should lend itself to measuring degradation under conditions of anaerobiosis or low temperature. (Little-Battelle)
W74-00269

DISPERSION AND TRANSPORT OF RHODAMINE B DYE AND METHOXYCHLOR IN RUNNING WATER: A PRELIMINARY STUDY,
Queen's Univ., Kingston (Ontario). Dept. of Biology.
R. R. Wallace, W. F. Merritt, and A. S. West.
Environmental Pollution, Vol 5, No 1, p 11-18, July 1973. 2 fig, 24 ref.

Descriptors: (*Pesticide kinetics, *Dye dispersion), *Monitoring, *Path of pollutants, Running waters, Chlorinated hydrocarbon pesticides, Fluorescent dye, Pesticide residues, Water analysis, Pollutant identification, Insecticides, Rhodamine, Fluorometry, Chemical analysis, Pollutants.
Identifiers: *Rhodamine B, *Methoxychlor, Chemical indicators, Organic dyes, Gas liquid chromatography, Tetraethyl di-amino-o-carboxy-phenyl-xanthenyl chloride, 1 1 1-Trichloro-2 2-bis (p-methoxyphenyl)enthane.

A study was carried out to ascertain if the fluorescent dye Rhodamine B (tetraethyl di-amino-o-carboxy-phenyl-xanthenyl chloride) could be used as an indicator for the insecticide methoxychlor (1,1,1-trichloro-2,2-bis (p-methoxyphenyl)ethane) which, when used as an emulsifiable concentrate against blackfly larvae, disperses readily in running water. Two streams north of Baie Comeau, Quebec, were used with the chemicals being administered to fast water riffles in both streams. Concurrent insecticide-Rhodamine B treatment and experiments with Rhodamine B alone were carried out. A submersible sampling pump was placed mid-channel near the bottom of the stream to ensure a constant flow of about 12 l/min to the fluorometer. Readings were recorded at minute intervals and the insecticide residue content in water samples was determined by fluorometry and gas-liquid chromatography. The arrival times for the peak concentration of dye were quite different in the 2 streams at roughly equivalent distances downstream. However, the results have shown that the dye can provide useful information for planning future larvicide treatments and can form a basis for monitoring insecticide concentrations downstream from ground-level application sites, or for predicting effects in other streams of similar character in advance of actual or potential loadings. (Holoman-Battelle)
W74-00279

PHOTOLYSIS OF THE HERBICIDE DINITRAMINE (N3,N3-DIETHYL-2,4-DINITRO-6-TRIFLUOROMETHYL-M-PHENYLENEDIAMINE),
United States Borax Research Corp., Anaheim, Calif.
H. C. Newsom, and W. G. Woods.
Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 598-601, July/August 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Herbicides, Halogenated pesticides, Solar radiation, Aqueous solutions, Water analysis, Pollutant identification, Methodology, Degradation (Decomposition), Chemical analysis, Gas chromatography, Mass spectrometry, Nuclear magnetic resonance.
Identifiers: *Degradation products, *Dinitramine, *Photodegradation, *Degradation rates, *Photolysis, Methanol, Fate of pollutants, Photodecomposition, Metabolites.

The degradation rate and products of the photolysis of the herbicide dinitramine (N3,N3-diethyl-2,4-dinitro-6-trifluoromethyl-m-phenylenediamine) in methanol and in water were investigated. Of concern also were sunlight degradation of aqueous dinitramine, the sunlight irradiation of dinitramine in natural waters and on sand, photolysis of C-14-labeled dinitramine in water, and the photolysis of 5-amino-1,2-dihydroxy-3-ethyl-2-ethyl-4-nitro-6-trifluoromethylbenzimidazoline. The compound was found to degrade rapidly through reductive cyclization of a nitro group and an adjacent N-ethyl group to give the following products: 6-amino-1-ethyl-2-methyl-7-nitro-5-trifluoromethylbenzimidazole; 5-amino-1,2-dihydroxy-3-ethyl-2-methyl-4-nitro-6-trifluoromethylbenzimidazoline; 1-ethyl-6-hydroxylamino-2-methyl-7-nitro-5-trifluoromethylbenzimidazole; and 6-amino-2-methyl-7-nitro-5-trifluoromethylbenzimidazole. (Holoman-Battelle)
W74-00282

MERCURY: ENVIRONMENTAL CONSIDERATIONS, PART I,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 05C.
W74-00292

PROTEIN ADSORPTION BY SUSPENDED SEDIMENTS: EFFECTS OF PH, TEMPERATURE, AND CONCENTRATION,
Alaska Univ., College. Inst. of Water Resources.
A. P. Murray.
Environmental Pollution, Vol 4, No 4, p 301-312, June 1973. 6 fig, 2 tab, 9 ref. OWRR A-030-ALAS (3).

Descriptors: *Proteins, *Adsorption, Aquatic environment, *Suspended solids, *Sediments, *Environmental effects, Water temperature, Hydrogen ion concentration, Variability, Soil analysis, Water analysis, Bottom sediments, Bottom sampling, Water sampling, Chemical analysis, Aquatic soils, Colorimetry, *Alaska, Kaolinite, Illite, Montmorillonite, Particle size, Clay minerals, Path of pollutants.
Identifiers: Natural waters, Chemical concentration, Characterization, Fate of pollutants, Sample preparation, Tanana River, Lowe River, Knik Arm, Bovine serum albumin.

The affinities of sediment materials from various natural, silt-laden waters in Alaska, and their variation with pH, temperature and protein concentration, were determined for the protein bovine serum albumin. Water and bottom soil samples were collected from Alaskan river systems in summer and autumn. The water samples were characterized in terms of the particle size distributions of their suspended matter and the soil samples were characterized before their use in adsorption experiments. The sediment sample or reference sample for the adsorption experiments was placed in an Erlenmeyer flask to which was added a temperature-equilibrated solution of the protein in distilled water or buffer solution. The flask was capped, contents mixed, set in an incubator-shaker and shaken at 200 rpm on a rotary motion shaker at a known temperature for at least 24 h. To determine the amount of protein remaining in solution at equilibrium, an aliquot of the suspension was centrifuged and the supernatant was analyzed for protein by the Folin-Ciocalteu colorimetric method. As expected, the pH of the water system plays an important role in the amount of the protein bovine serum albumin adsorbed by suspended sediments. For the soil materials studied, maximum adsorption was observed at pH 3; minimum at pH 6.5. The behavior of the Alaskan sediments in this respect was similar to that of kaolinite and montmorillonite but unlike that of illite. From experiments in which the adsorptive capacities of the sediments were measured as a function of the initial amount of protein, it was found that the equilibrium concentration of protein remaining in solution could be related to the initial protein:sediment ratio by the equation: c equals k times the quanititiy P sub o divided by m raised to the n power. Variations in temperature from 5C to 25C had no detectable effect on the amount of protein adsorbed. The amount of protein adsorbed (at the pH of the natural water systems) on to suspended sediments would have a negligible effect on the rate at which the protein would be decomposed in the aqueous environment. (Holoman-Battelle)
W74-00293

TOXIC MATERIALS ANALYSIS OF STREET SURFACE CONTAMINANTS,
URS Research Co., San Mateo, Calif.
R. E. Pitt, and A. Gary.
Copy available from GPO Sup Doc as EP1.23/2:73-283, $1.55; microfiche from NTIS as PB-224 677, $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-283, August 1973. 143 p, 10 fig, 67 tab, 61 ref. EPA Project 11034 FUJ.

Descriptors: *Storm runoff, *Surface runoff, *Urban runoff, Pollution (Water), Solids, *Heavy metals, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: Street cleaning, *Street-surface contaminants.

Because of the large amounts of toxic materials (especially heavy metals) found associated with street surface particulates during the course of a previous study (Water Pollution Aspects of Street Surface Contaminants), additional work has recently been completed which defines the distribution and range of heavy metals on the Nation's city streets. This project defined the breakdown of the particulates' compositions by having mass spectographic analyses performed on various samples. Using these results, the heavy metals which were determined to have the greatest water pollution potential (As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Sr, Ti, Zn, and Zr) were analyzed in each of about 75 samples collected nationwide in 10 cities in the previous study. (See also W73-06212) (EPA)
W74-00306

SALINITY STUDIES IN EAST GLADES AGRICULTURAL AREA, SOUTHEASTERN DADA COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 03C.
W74-00329

WATER-SALT BALANCE OF GROUNDWATER IN THE GOLODNAYA STEPPE IN 1969 (VODNO-SOLEVOY BALANS PODZEMNYKH VOD GOLODNOY STEPI ZA 1969 GOD),
Ministerstvo Geologii, Tashkent (USSR).
For primary bibliographic entry see Field 04B.
W74-00340

HYDROGEOLOGICAL BASIS FOR PROTECTION OF GROUNDWATER AND WATER WELLS FROM POLLUTANTS (GIDROGEOLOGICHESKOYE OBOSNOVANIYE ZASHCHITY PODZEMNYKH VOD I VODOZABOROV OT ZAGRYAZNENIY),
F. M. Bochever, and A. Ye. Oradovskaya.
Izdatel'stvo 'Nedra', Moscow, 1972. 129 p.

Descriptors: *Water pollution, *Pollutants, *Path of pollutants, *Groundwater, *Water wells, Industrial wastes, Waste disposal, Waste storage, Waste water (Pollution), Aquifers, Movement, Flow, Diffusion, Dispersion, Sorption, Forecasting, Laboratory tests, On-site tests, Dye releases, Equations.
Identifiers: USSR, Dye tracer studies.

Pollution of groundwater by industrial wastes and fundamentals of a theory of pollutant movement in groundwater are examined. Methods are presented for calculating flow from waste disposal pits and flow to water wells, for forecasting pollutant travel in aquifers, and for determining physicochemical parameters of pollutant migration in groundwater under laboratory and field conditions. (Josefson-USGS)
W74-00347

SOME ASPECTS OF THE HYDRODYNAMIC DISPERSION OF SOLUTES IN POROUS MATERIALS,
Rothamsted Experimental Station, Harpenden (England).
For primary bibliographic entry see Field 02G.
W74-00360

DISPERSION-AFFECTED TRANSPORT OF REACTING SOLUTES IN SATURATED POROUS MEDIA: GALERKIN METHOD APPLIED TO EQUILIBRIUM-CONTROLLED EXCHANGE IN UNIDIRECTIONAL STEADY WATER FLOW,
Geological Survey, Menlo Park, Calif.
J. Rubin, and R. V. James.
Water Resources Research, Vol 9, No 5, p 1332-1356, October 1973. 7 fig, 22 ref.

Descriptors: *Dispersion, *Ion exchange, *Ion transport, *Groundwater movement, Path of pollutants, Water chemistry, Mass transfer, Solutes, Chemical reactions, Saturated flow, Translocation, Leaching, Mathematical studies, Numerical analysis.
Identifiers: *Galerkin method.

Equations describing dispersion and ion exchange in one-dimensional transport of solutes in saturated porous media may be solved numerically by means of the Galerkin method. It is assumed that water flow is steady and that local chemical equilibrium exits throughout the systems considered. No constancy restrictions are placed on the total concentration of the dissolved ions participating in exchange. The cases treated involve (1) homogeneous or layered systems, (2) exchange reactions with constant or concentrations dependent selectivity coefficients, (3) binary or multicomponent exchange, and (4) systems in which one of the exchanging ions is also involved in a precipitation-dissolution reaction. The approach may be useful in analyzing a variety of solute transport processes of hydrologic interest. (Knapp-USGS)
W74-00364

EXPERIMENTAL AND MATHEMATICAL MODELING OF LIQUID-LIQUID MISCIBLE DISPLACEMENT IN POROUS MEDIA,
Kansas Univ., Lawrence. Dept. of Chemical and Petroleum Engineering.
For primary bibliographic entry see Field 02F.

W74-00366

DISPERSION DURING FLOW IN POROUS MEDIA WITH BILINEAR ADSORPTION,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
S. P. Gupta, and R. A. Greenkorn.
Water Resources Research, Vol 9, No 5, p 1357-1368, October 1973. 4 fig, 1 tab, 27 ref.

Descriptors: *Path of pollutants, *Dispersion, *Groundwater movement, Numerical analysis, *Adsorption, Porous media, Farm wastes, Industrial wastes, Fertilizers, Pesticides, Herbicides, Water pollution sources.

Major sources of pollution in underground water come from the runoff of cattle feedlots, from runoff of fertilizers, pesticides, and herbicides from cultivated lands, and from domestic and industrial wastes. The equations for the dispersion and adsorption of various chemicals in porous media are formulated to calculate pollution movement. If a bilinear rate of adsorption is assumed, two coupled nonlinear parabolic partial differential equations result. The equations can be solved by the Crank-Nicolson method, which is a stable, two-step method. Solutions for the range of variables involved in the movement of pollutants in porous media are obtained for a one-dimensional model. (Knapp-USGS)
W74-00367

PICLORAM MOVEMENT FROM A CHAPARRAL WATERSHED,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
C. A. Davis, and P. A. Ingebo.
Water Resources Research, Vol 9, No 5, p 1304-1313, October 1973. 3 fig, 2 tab, 30 ref.

Descriptors: *Path of pollutants, *Herbicides, *Runoff, Pesticide residues, Water pollution sources, Pesticide drift, Translocation, Water yield improvement, *Arizona, Chaparral, Watershed (Basins).
Identifiers: *Picloram.

After a brush control treatment of soil-applied pellets of picloram (9.3 lb acid equivalent per acre) on a 2.1-acre side slope of a 46-acre chaparral watershed in central Arizona, picloram was detected in the stream water at a gaging station at the outlet of the watershed. Maximum measured concentrations (250-370 ppb) occurred during the first 3 months after treatment and were associated with heavy rainfall. After 14 months and 40 inches of accumulated rainfall, picloram was no longer detected in the stream water. An estimated 4.5% of the picloram applied was lost to stream water. Direct use of stream water from the outlet of the treated watershed when picloram levels were 46-370 ppb could have damaged sensitive crops such as cotton. (Knapp-USGS)
W74-00370

EFFECT OF AGRICULTURAL MANAGEMENT OF WET SLOPING SOIL ON NITRATE AND PHOSPHORUS IN SURFACE AND SUBSURFACE WATER,
Agricultural Research Service, Burlington, Vt. New England Watershed Research Center.
G. R. Benoit.
Water Resources Research, Vol 9, No 5, p 1296-1303, October 1973. 3 fig, 3 tab, 13 ref.

Descriptors: *Nitrates, *Phosphates, *Path of pollutants, *Water pollution sources, *Fertilizers, Farm wastes, Runoff, Groundwater, Leaching, Infiltration, Drainage water, Subsurface drainage, Drainage practices.

Differences in nitrate and phosphate content of water from three cropping systems were evaluated in a 12-plot study in East Franklin, Vermont, on a poorly drained, sloping Cabot silt loam: (1) timothy, red clover, Kentucky bluegrass hay-pasture; (3) corn silage. Six plots were in alfalfa hay, six plots were planted in corn, and the upslope area was in hay-pasture. Soil samples were collected in the summers of 1969 and 1970 and analyzed for total soil nitrogen. Surface and subsurface drain effluent samples from the plots and upslope area were analyzed for nitrates and phosphates. Draining wet sloping land may decrease total soil nitrogen; nitrate nitrogen may be lost from organic matter breakdown in cold but unfrozen soil; nitrates but not phosphates will move both vertically and laterally through the soil to subsurface drains; surface runoff ontains few nitrates but significant concentrations of phosphates; and more nitrates were lost from fertilized corn plots than from alfalfa plots or hay-pasture areas. (Knapp-USGS)
W74-00371

ANNUAL CYCLE IN RIVER WATER QUALITY: A TIME SERIES APPROACH,
King's Coll., London (England). Rogate Field Center.
A. M. C. Edwards, and J. B. Thornes.
Water Resources Research, Vol 9, No 5, p 1286-1295, October 1973. 6 fig, 5 tab, 17 ref.

Descriptors: *Time series analysis, *Water quality, *Streamflow, *Path of pollutants, Frequency analysis, Statistics, Statistical methods, Variability, Regression analysis, Fourier analysis, Correlation analysis.
Identifiers: *River Stour (England).

Regression, spectral, and cross-spectral techniques were used to examine the trends and periodicity in a 20-year record of weekly observations of eight water quality variables in the River Stour, eastern England. Linear regression shows that all except pH and carbonate hardness have significantly increased over time. A strong annual cycle is present. Cross-spectral analysis was used to model the relationship between the variables and the water discharge in time. Nitrate and non-carbonate hardness are positively correlated with discharge, whereas carbonate hardness is an inverse function. (Knapp-USGS)
W74-00372

CESIUM 137 IN A MOUNTAIN STREAM CHANNEL,
Colorado State Univ., Fort Collins. Dept. of Watershed Sciences.
J. E. Hubbard, and W. D. Striffler.
Water Resources Research, Vol 9, No 5, p 1440-1442, October 1973. 1 tab, 6 ref.

Descriptors: *Radioisotopes, *Fallout, *Cesium, *Alluvium, Sediments, *Colorado, Path of pollutants, Snowpacks, Snowmelt.

Concentration of the radionuclide Cs-137 in water, sediment, and channel vegetation was determined in a Colorado mountain watershed in 1967. No measurable Cs-137 was found in stream water. Specific Cs-137 activity in sediment decreased exponentially with distance from the headwaters. Its concentration was 124 pc/g at the headwaters, where a snowfield has existed continuously since the atmospheric testing of nuclear weapons, to 4 pc/g 5600 meters downstream. Stream vegetation samples also indicated a similar decrease in specific Cs-137 activity with site location downstream. (Knapp-USGS)
W74-00376

LOSS OF PARTICULATE ORGANIC MATERIALS FROM SEMIARID WATERSHEDS AS A RESULT OF EXTREME HYDROLOGIC EVENTS,
Utah State Univ., Logan. Watershed Science Unit.
For primary bibliographic entry see Field 02A.
W74-00378

EFFECT OF INSOLUBLE GRAINS ON LEACHATE FROM POROUS BEDS,
Syracuse Univ., N. Y. Dept. of Civil Engineering.
W-H., Li, and F. H. Feng.
Water Resources Research, Vol 9, No 5, p 1462-1464, October 1973. 3 fig, 2 ref.

Descriptors: *Leaching, *Porous media, *Path of pollutants, Solubility, Hydraulic models, Waste disposal, Industrial wastes.

Some industrial wastes are composed of soluble and insoluble grains. When such waste is deposited as a waste bed, the soluble material may become a continuous source of pollutant to water. Under certain conditions it is advisable to leach out the soluble material at a controlled rate. As the soluble material is being leached out, the voids and the ratio of the soluble parts to the insoluble parts of the bed change slowly with time. In the leaching of a porous bed composed of soluble and insoluble grains the concentration of dissolved material in the leachate is influenced by the presence of the insoluble material. This influence was studied by modeling the bed as a laminar tube with a wall composed of consecutive soluble and insoluble rings. The presence of the insoluble wall surfaces has a negligible effect on the leachate if they are less than 50% of the total wall surface. (Knapp-USGS)
W74-00379

NUTRIENT LOSSES AFTER CLEAR-CUT LOGGING AND SLASH BURNING IN THE OREGON COAST RANGE,
Oregon State Univ., Corvallis. School of Forestry.
For primary bibliographic entry see Field 04C.
W74-00381

AN EVALUATION OF MIXING IN THE TAY ESTUARY,
East of Scotland Water Board, Invergowrie (Scotland).
For primary bibliographic entry see Field 02L.
W74-00384

A NUMERICAL MODEL OF THE ST. LAWRENCE RIVER,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Lab.
For primary bibliographic entry see Field 02L.
W74-00385

ANALYTICAL MODELING OF ESTUARINE CIRCULATION,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 02L.
W74-00386

MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
P. Goodrich.
PH D Thesis, 1970. 135 p, 57 fig, 3 tab, 49 ref.

Descriptors: *Path of pollutants, *Phosphates, Soil contamination, *Saturated soils, Isotherms, Sands Diffusion, *Adsorption, Clay, *Soil columns, Radioisotopes, Denitrification, Waste water (Pollution), Electromagnetic waves, Instrumentation, Effluents, *Irrigation, Water pollution, *Waste disposal, Nutrients, Farm wastes, *Monitoring.
Identifiers: Radioactive tracer solutions, Scintillator, Automatic data collection, Sandy loam, Land disposal, Influent.

A laboratory experiment was carried out using uniform soil columns and radioactive tracer solutions to monitor movement of phosphorus inside soil columns. An electronic data acquisition

system was developed to monitor long term study. Results were compared with adsorption models already developed. Simulated high-phosphate irrigation showed the limited capabilities of surface soil in preventing ground water pollution. Sand and sandy loam soils were tested. Results emphasized the importance of clay minerals in phosphate adsorption. However, soils have a finite capacity for adsorbing phosphate, and continuous flushing as in irrigation may cause the phosphate to move quickly to great depths, thus affecting ground water. Therefore, the design of dispoal fields must be considered in order to prevent over-accumulation of phosphorus in soil columns. (Frantz-East Central)
W74-00392

WATER POLLUTION BY SWINE PRODUCTION OPERATIONS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00394

BIOLOGICAL ASPECTS OF AGRICULTURE'S EFFECTS ON ENVIRONMENTAL QUALITY,
Kentucky Univ., Lexington. Dept. of Entomology.
H. W. Dorough.
In: Quality of the Environment, Socio-Economic, Biological and Engineering Aspects, Papers presented at the College of Agriculture Annual Conference, University of Kentucky, January 5-7, 1971. p 8-13 (1971).

Descriptors: Agriculture, *Kentucky, Runoff, *Farm wastes, Surface waters, *Insecticides, Toxicity, Soils, Dairy industry, Erosion, Fertilizers, Livestock, Air pollution, Water pollution, *Soil contamination, Sedimentation, *Pesticide residues.
Identifiers: Tobacco industry, *Environmental quality.

Agriculture depends upon maintaining a quality environment. But, it may have various detrimental effects on that environment. The Environmental Quality Task Force in the University of Kentucky College of Agriculture was established to evaluate the following problems: pesticides, sediment, farm wastes and fertilizers. Concentrated pesticide use contaminates surface water, air and especially soil. Erosion and sedimentation aid in the transportation of pollutants in streams. The phosphorus and nitrogen from farm wastes and certain nutrients from fertilizers are major sources of water pollution. Evaluation of the general use of pesticide contamination problem in Kentucky indicates cause for concern, but the situation is not yet critical. (Frantz-East Central)
W74-00396

SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES,
Southwestern Great Plains Research Center, Bushland, Tex.
B. A. Stewart, and A. C. Mathers.
Contribution from Soil and Water Conservation Research Divsion, Agricultural Research Service, U.S. Department of Agriculture in cooperation with the Texas Agricultural Experiment Station, Texas A and M University (1972). 3 p, 1 tab, 2 fig, 9 ref.

Descriptors: *Feed lots, *Farm wastes, *Water pollution, *Soil contamination, Cattle, *Nitrates, *Pollutants, Soil profiles, *Waste disposal, Water, Salt, Leaching.
Identifiers: Soil conditions, Croplands.

Nitrate and other pollutants often accumulate in soil profiles under large feedlots. Water movement through these profiles, however, is usually very slow or does not occur, especially in the more arid areas. A greater pollution hazard results from spreading large amounts of animal wastes on cropland for the purpose of waste disposal rather than for improving soil conditions or crop growth and quality. A recent study showed that substantial quantities of nitrate accumulated when manure was applied to land at rates of 30 tons/acre or greater. Salt accumulation was also high enough to cause some injury to plant growth. Leaching can reduce the salt concentration, but may increase nitrate pollution of the drainage water. Indications are that pollution hazards are eliminated only when the growing crop utilizes most of the applied nitrogen. When the rate of manure application is too high, nitrate will accumulate in the soil and in some crops or will move through the soil with percolating water. (East Central)
W74-00399

EXCRETION STUDIES IN SWINE FED ARSANILIC ACID,
Abbott Laboratories, North Chicago, Ill. Nutrition Research Dept.
L. R. Overby, and D. V. Frost.
Journal of Animal Science, Vol 19, No 1, p 140-144, January, 1960, 2 tab, 9 ref.

Descriptors: *Arsenic, *Farm wastes, *Swine, *Diets, *Feeding, Poultry.
Identifiers: *Arsanilic acid.

The rates of arsenic excretion were determined in the feces and urine of swine receiving arsanilic acid at 30, 60 and 90 gm. per ton of feed. Much more arsenic was excreted in the feces than in the urine. After 10 days of arsanilic acid feeding, total excretion was in approximate balance with intake at the two lower levels of feeding. After the arsenical was withdrawn from the ration, the charcteristic excretion level continued for two days, then decreased rapidly. This conforms with knowledge of the rate of disappearance of arsenic from tissues of animals fed arsanilic acid. The nature of the major part of the arsenical excreted was not determined. Unchanged arsanilic acid was not detected in the urine, but was present in the feces in an amount representing about 5% of the arsanilic acid consumed. (EastCentral)
W74-00400

NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW,
Geological Survey, Menlo Park, Calif.
J. H. Feth.
Water Resources Research, Vol 2, No 1, p 41-58, 1st Quarter, 1966. 1 fig, 9 tab, 57 ref.

Descriptors: *Reviews, *Nitrogen, Water, *Farm wastes, Groundwater, Public health, Fixation, *Nitrogen cycle, *Water pollution, Air pollution, Soil contamination, Fertilizers, Proteins, Rocks, Leaching, Precipitation, Atmosphere, Ammonia, Aerosols, Water quality, Geochemistry.

Nitrogen compounds in natural water are significant in public health, agriculture, industry, and geochemistry. The many sources of nitrogen compounds and the deep involvement of nitrogen in the life processes of organisms makes the study of such compounds difficult. The sources include natural aerosols, precipitation, fixation by microorganisms in soil and water, decaying organic matter, and animal and industrial wastes, as well as probably undiscovered sources in consolidated and unconsolidated rocks. Nitrogen compounds are both oxidized and reduced by organisms. Some nitrogen compounds are adsorbed on clay. The theoretical end product in water and the compound probably most often determined is NO2-1. The concentration of nitrogen compounds ranges from 0.0 to > 100 ppm in surface water and from 0.0 to > 1000 ppm in groundwater. Seasonal fluctuations occur. Much further research is needed, including improvements in methods of analysis, further investigation of sources, and detailed study of the nitrogen cycle in small drainage basins. (East Central)
W74-00402

OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION OF URINARY NITROGEN EXCRETED AS UREA IN SHEEP,
Rowett Research Inst., Bucksburn (Scotland).
J. J. Robinson, D. Scott, and C. Fraser.
Journal of Agricultural Science, Vol 80, No 3, p 363-368, June 1973. 3 tab, 4 fig, 14 ref.

Descriptors: *Sheep, Diets, Energy.
Identifiers: *Protein intake, *Gestation, *Urinary nitrogen, *Nitrogen retention.

The effect of altering the level of protein intake on urea excretion in ewes w s assess d in two separate experiments. In Experiment 1, 14 pregnant (during th last 20 days of gestation) and 10 non-pregnant ewes were each offered a different level of digested N intake in the range 5-25 g/day. At all levels of protein intake urea N excretion was lower in pregnant than in non-pregnant ewes. In Experiment 2, 21 pregnant ewe lambs were each offered one of three diets supplying mean intakes of 83 (T 1), 113 (T 2) or 147 (T 3) g crude protein/day. During the last 100 days of gestation the mean levels of urea n excretion were 6.9, 11.0 and 15.2 g/day for T 1, T 2 and T 3, respectively. The corresponding values for urinary N excretion were 9.3, 13.8 and 18.2 g/day. At all levels of protein intake urea N excretion was lower just prior to parturition than 95 days prepartum; the difference was correlated with lamb birth weight and maternal body-weight change. A notable feature of both experiments was the low level of urea N excretion by the pregnant ewes in late gestation, at low protein intakes. It would appear that when energy intake is adequate the decrease in urea N excretion associated with pregnancy is a direct re ult of an increased N requir ment for maternal and/or foetal growth. (East Central)
W74-00408

ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY AREA,
Agricultural Research Service, Riverside, Calif.
R. E. Luebs, K. R. Davis, and A. E. Laag.
Journal of Environmental Quality, Vol 2, No 1, p 137-141, January-March 1973. 3 fig, 3 tab, 18 ref.

Descriptors: *Dairy industry, *Cattle, *Nitrogen, Ammonia, *Air pollution, Feed lots, *Water pollution, Toxicity, *Farm wastes, Sampling, Temperature, Humidity, Winds, Rainfall.
Identifiers: Distillable nitrogen, Nondistillable nitrogen, Atmospheric NH3, Enrichment.

A dairy cow population of 143,000 in an area of 150 km2 enriched the atmosphere with distillable N (mostly NH3) over an area in excess of 560 km2. Over an area of 35 km2, where cow population density was approximately 1,600 cows/km2, the concentration of distillable N in the atmosphere was between 20 to 30 times greater than at a control site outside the dairy area. Highest concentrations of N were associated with wet corral surfaces and favorable evaporative conditions. Approximately 20% of the total N absorbed by acid-surface traps in the dairy area was nondistillable N while filtered air samples contained 5% or less. Rainfall delivered three times as much N to the land surface inside than outside the dairy area. (East Central)
W74-00409

NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS,
Guelph Univ. (Ontario). Dept. of Land Resource Science.
D. G. Bielby, M. H. Miller, and L. R. Webber.

Journal of Soil and Water Conservation, Vol 28, No 3, p 124-126, May-June, 1973, 4 tab, 3 ref.

Descriptors: *Nitrates, *Farm wastes, *Lysimeters, *Corn, Slurries, *Waste disposal, Groundwater, Soils, *Poultry, Irrigation, Denitrification, Ontario.
Identifiers: *Percolates, Guelph sandy loam.

The quantity and concentration of nitrates in percolates from lysimeters receiving liquid poultry manure applications were determined over a 3-year period. Nitrogen removed by corn, plus that in percolates, accounted for less than 25 percent of the amount applied to the soil. Most nitrates in the percolates were discharged from the lysimeters after corn harvest. The average concentration of nitrates in percolates from all treatments and for all years exceeded 10 parts per million. (East Central)
W74-00417

THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE,
Nebraska State Dept. of Environmental Control, Lincoln. Solid Waste Div.
G. A. Frecks, and C. B. Gilbertson.
Paper no, 73-442 presented at the 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 24 p, 6 tab, 6 fig, 20 ref.

Descriptors: *Cattle, *Farm wastes, Kentucky, *Feeds, *Digestion, Volatility, Shrinkage, Porosity, Chemical properties, Physical properties, Volumetric analysis, Sieve analysis, Density, *Waste treatment, *Waste storage, Solids, Moisture content, Chemical oxygen demand, Engineering.
Identifiers: *Ration, Drying rates.

Beef cattle were fed a high concentrate ration (HCR) and a high roughage ration (HRR) for five days. Samples of feces and urine were collected and analyzed to assist in the engineering design of materials handling and processing equipment and storage facilities. The total, volatile, and fixed solids content were not affected by the ration. Of the HCR wastes, 20% was retained on a 2 mm. sieve as compared to 2% for the HRR wastes. Volume change from original moisture contents to dry solids was 55% for the HCR and 7.4% for the HRR feces. Due to its more porous structure the HRR feces dried at twice the rate of the HCR. (Frantz-East Central)
W74-00420

CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 03C.
W74-00425

AGRICULTURE AND ENVIRONMENT,
W. H. Garman.
Crops and Soils, Vol 25, No 9, p 14-19, Aug-Sept, 1973.

Descriptors: Photosynthesis, *Water pollution, *Nitrates, Phosphates, Soils, Eutrophication, *Livestock, Agriculture, *Farm wastes, Farm animals, *Fertilizers, Feed lots, Algae, Plankton, Nutrients, Carbon dioxide, Wells, Lakes, Balance of nature.

Questions regarding agriculture and the balance of nature are answered. The use of nitrogen fertilizers can under some circumstances be harmful to farm animals, but has never presented a human health problem. Farming and nitrate fertilizers seldom, except under extreme circumstances, contribute to nitrate levels in streams, lakes, and water wells. Fertilizers seldom cause excessive algae growth. Long term experiments show that fertilizer use has not damaged soils. (Frantz-East Central)
W74-00427

A MULTIPARAMETER OIL POLLUTION SOURCE IDENTIFICATION SYSTEM,
Phillips Petroleum Co., Bartlesville, Okla. Research and Development Dept.
For primary bibliographic entry see Field 05A.
W74-00432

BACTERIAL FLAGELLAR UNCOORDINATION AS A MONITOR FOR INDUSTRIAL POLLUTANTS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
N. R. Krieg.
Completion Report, WRRC Project No. 2003240 1973. 10 p, 1 fig, 2 tab.

Descriptors: *Bioindicators, *Monitoring, Bacteria, Industrial wastes, Pollutant identification, Toxins, *Path of pollutants, Ions, Zinc, Nickel, Copper, Mercury, Lead.
Identifiers: *Spirillum volutans, *Flagellar uncoordination.

A rapid, simple, and relatively inexpensive standardized method has been developed for the in-plant biological monitoring of levels of toxicants in industrial effluent using flagellar uncoordination in Spirillum volutans as the indicator response. Zinc, nickel, copper, mercury, and lead ions could be detected at concentrations of 2 or 3 ppm; cetyl pyridinium chloride at 1 ppm; aniline at 30 ppm; and other compounds in a similar concentration range. Combinations of metals were detected when each was present at a level lower than its minimum effective concentration when used alone. The response, which is visible immediately by darkfield microscopy at 125X, is a marked and obvious change in the motility of the organism. Normal cells reverse frequently because the polar fascicles of flagella reorient, forming 'head' and 'tail' cones of rotation which propel the cell through the medium. Various compounds cause the flagella to become uncoordinated, forming two 'head' or two 'tail' fascicles on the same cell, which is then unable to seim because of opposing propulsion. The method was developed for use in testing samples of effluent for uncoordinating concentrations of toxic agents before discharge into a receiving stream.
W74-00438

SULPHUR POLLUTION PATTERNS OBSERVED: LEACHING OF CALCIUM IN FOREST SOIL DETERMINED,
Norske Skogforsoksvesen, Oslo.
L. N. Overrein.
Ambio. Vol 1, No 4, p 145-147. 1972. Illus.
Identifiers: *Calcium, Forest soils, Iron, *Leaching, Magnesium, *Norway, Pollution sources, Potassium, Precipitation, Sodium, Soils, *Sulfur.

Two aspects of S pollution are presented. The deposition pattern around a Norwegian industrial center was mapped and experiments were conducted to determine the effect of varying acidity precipitation on the Ca levels of forest soils. To chart the deposition pattern, pollution gradients were obtained from snow samples taken around Heroya, an industrial center in southern Norway. The measurements indicated that rural districts, 15-40 km outside the main source of pollution, received the greatest amounts of excess acid in precipitation. The largest deposits of Ca, Mg, Fe, Mn, K, Na and sulfate were confined to the urban district near the source of pollution. The leaching of Ca in different soil types increases drastically when the acidity of the precipitation is increased. The acidity of the soil was determined primarily by 4 factors: the concentration of excess acid in precipitation; the amount of acid water penetrating the soil profile; the susceptibility to leaching of the nutrient elements available; and, the buffer capacity of the soil. The gradual acidification of the soil is accompanied by increasing acidity in the groundwater. An increasingly acid precipitation represents an environmental stress in areas where the soil is susceptible to excess acid and leaching and there might be serious consequences for the various ecosystems established in those areas.--Copyright 1973, Biological Abstracts, Inc.
W74-00476

DYNAMICS OF TRACE ELEMENTS IN LIMAN--MEADOW SOILS OF THE ARID ZONE OF CENTRAL KAZAKHSTAN, (IN RUSSIAN),
Akademiya Naik Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
V. A. Zhukova, and E. A. Solodnikova.
Izv Akad Nauk Kaz SSR Ser Biol. 1. p 6-11. 1972.
Identifiers: Arid zones, Boron, Cobalt, Copper, Irrigation, Manganese, Molybdenum, *Soils (Liman-meadow), *Trace elements, *USSR (Kazakhstan), Zinc.

Cu, Zn, Mn, Co, Mo and B were studied at various depths in soil of Central Kazakhstan (USSR). Irrigation was the main factor in formation of hydromorphic soils. These soils are formed under leaching and oozing water regimes. The upper layers during some seasons of the year contain highly active forms of Cu, B, average and low forms of Co, low and very low forms of Zn and Mo. The mechanical composition of the soil is an important factor in the quantity of active Mn. Provision of Mn in clayey soils is high, in loamy soils Mn varies from low (in spring-summer) to high (late summer, early fall) levels. With depth, the content of active forms of Cu, Mn and Co decrease, while Zn, B and Mo increase in liman-meadow soils.--Copyright 1973, Biological Abstracts, Inc.
W74-00479

DESMIDIACEAE OF WASTE WATERS, (IN RUSSIAN),
Kharkov State Univ. (USSR).
For primary bibliographic entry see Field 05D.
W74-00485

RESEARCH ON THE METTMA BROOK AT FALKAU, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Institut.
J. Schwoerbel.
Arch Hydrobiol Supplement B. Vol 42, No 1, p 91-94. 1972. Illus. (English summary).
Identifiers: *Germany (Mettma stream), Pollution sources, *Brewery waste water.

Between May 1970 and May 1971, the running water research staff of the Limnological Institute of the University of Freiburg (Germany) examined the bioactivity of the mountain brook Mettma (Germany), which lies in the south of the Black Forest and is polluted by a brewery's waste water. A short introduction is presented to the results described in later papers.--Copyright 1973, Biological Abstracts, Inc.
W74-00497

THE METTMA: A MOUNTAIN STREAM AS A BREWERY'S DRAINING DITCH: MICROBIOLOGICAL INVESTIGATIONS ALONG THE GRADIENT OF POLLUTION, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Institut.
W. Reichardt, and M. Simon.
Arch Hydrobiol Supplement B. Vol 42, No 1, p 125-138. 1972. Illus. (English summary).
Identifiers: Bacteria, *Brewery wastes, Draining ditches, Enzymes, *Germany (Mettma stream),

Microbiological studies, Mountain streams, *Pollution gradient, Streams, *Self purification.

A small mountain stream (Mettma, in Germany) is polluted by waste water from a brewery. The process of self-purification was investigated. The number of heterotrophic bacteria and the biochemical activities of maltase, alkaline phosphatase, dehydrogenase, nitrate reductase and cellulase, mostly in both the water and in the sediment, were investigated.--Copyright 1973, Biological Abstracts, Inc. (See also W74-00497)
W74-00498

HYDROGRAPHY, CHEMISTRY AND LOAD OF NUTRIENTS OF A MOUNTAIN STREAM POLLUTED BY ORGANIC WASTE WATER, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Institut.
For primary bibliographic entry see Field 05C.
W74-00499

POLLUTION ENDANGERED UNDERGROUND WATERS IN THE NEIGHBOURHOOD OF A SEWAGE CATCHPIT DESIGNED ON THE MORAINE HIGHLAND OF NORTHERN POLAND,
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
A. S. Kleczkowski, J. Myszka, and J. Stobierski.
Bull Acad Pol Sci Ser Sci Terre. Vol 20, No 1, p 61-64. 1972.
Identifiers: Moraine highlands, *Poland, Pollution, *Sewage catchpit, Underground waters, Clay, Sands.

The sewage catchpit is located on permeable quaternary sands. Its bottom lies almost directly above the water table; it might even cut through it. The downflow of ground waters and impurities will run toward the river flowing at a distance of 500 m. The thin water-bearing horizon above the moraine is thus directly endangered. There is no natural protection of the moraine horizon (up to 20 m thickness). The efficient intermoraine horizon, protected by a continuous boulder clay layer of more than 2 m, is secure.--Copyright 1973, Biological Abstracts, Inc.
W74-00500

TIDAL CHARACTERISTICS OF TWO ESTUARIES IN FLORIDA,
W. B. Stelzenmuller.
Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 91, No WW3, Proceedings Paper 4431, p 25-36, August 1965. 10 fig, 2 ref.

Descriptors: *Estuaries, *Tidal effects, Water pollution, Sea level, Wind tides, Winds, Hurricanes, Storms, *Tidal streams, *Saline water intrusion, Runoff, Salt marshes, *Florida, Path of pollutants, *Gulf coastal plain.
Identifiers: Estuarine processes, *Estuarine pollution, Waccasassa River (Fla), Fenholloway River (Fla).

A study of tidal characteristics of the Waccasassa River and the Fenholloway River estuaries in the Gulf of Mexico (Florida) are reported. Results of a 2-year study are presented. Information is given on the influence of wind on tides and annual variations of sea level. Both estuaries have an exponential increase of cross-section with downstream distance and are in the category of partly-mixed estuaries. The influence of hurricanes is included. The two estuaries under study are physically similar in size, pattern of tidal action, low and marshy coastal segments with many interconnecting channels to adjacent creeks, rocky bottoms, and the extremely shallow coastal shelf into which they both empty. These similarities make the study of a virtually pristine tidal stream and a grossly polluted one especially worthwhile. The differences are principally the relatively steeper slope of the Fenholloway, which tends to reduce the diffusing action of salt water intrusion into the estuary, and the embayment of the Waccasassa, which is not duplicated at the Fenholloway. Wind effects on tidal heights and tidal mixing are especially important in the shallow waters of this section of the coast. The annual pattern of variation of sea level is also to be considered in evaluating the behavior of the estuaries in ridding themselves of pollution. Higher sea levels tend to coincide with higher run-off seasons and lower sea levels with lower run-off seasons along this coast. (Sinha-OEIS)
W74-00508

TWO STUDIES OF PESTICIDE RESIDUES,
Texas A and M Univ., College Station. Environmental Quality Program.
For primary bibliographic entry see Field 05C.
W74-00529

A STUDY OF PESTICIDE RESIDUE LEVELS AND INSECTICIDE RESISTANCE IN SELECTED AQUATIC ORGANISMS OCCURRING AROUND THE BRYAN-COLLEGE STATION AGRICULTURAL PRODUCTION AREAS,
Texas A and M Univ., College Station. Environmental Quality Program.
For primary bibliographic entry see Field 05C.
W74-00530

A SURVEY OF DDT RESIDUES IN FISH FROM THE BRAZOS AND NAVASOTA RIVERS AND SOMERVILLE RESERVOIR,
Texas A and M Univ., College Station. Environmental Quality Programs.
For primary bibliographic entry see Field 05C.
W74-00531

UNDERGROUND MOVEMENT OF WASTES CLARIFIED.

Chemical and Engineering News, p 15, October 15, 1973.

Descriptors: *Water pollution sources, *Groundwater movement, *Nuclear wastes, *Nuclear reactors, *Idaho, Path of pollutants, Tracers, Tritium, Model studies, Data collections, Correlation analysis, Mathematical models, Chlorides, Analytical techniques, Hydrolgeology, Water analysis.
Identifiers: *National Reactor Testing Station (Idaho).

Studies of the movement of radioactive materials and common inorganic chemicals at the National Reactor Testing Station in Idaho have led to development of a mathematical model which aids understanding of the Snake River Plain aquifer both hydrologically and chemically. Moreover, modeling techniques based on the results of these studies might be used in other large-scale problems of waste and water-resources management. Since 1952, just after the first reactor started up, an average of 200 million gallons a year of low-level radioactive wastes have gone to ponds. About 70% of the various activation and fission products are short-lived and of little significance. Of the others, only tritium has entered the Snake River Plain aquifer in detectable amounts. Tritium makes a very good tracer because it is unaffected by ion exchange or other interfering reactions. The mathematical model of waste transport developed by USGS at NRTS involves two main phases--hydrology and solute transport. The model-simulated chloride distributions match well with historical observations. The tritium distribution also is excellent. Forecasts for the various plumes show gradual growth and more dilution. (Woodard-USGS)
W74-00538

CIESM AND MARINE POLLUTION,
Office of Naval Research, London (England).
J. M. Leonard.
Available from NTIS, Springfield, Va. 22151 as AD-757 988; Price $3.00 printed copy; $1.45 microfiche. Report C-5-73, February 5, 1973. 11 p.

Descriptors: *Water pollution sources, *Water pollution control, *Oceans, *Conferences, *Foreign countries, Effluents, Liquid wastes, Sewage effluents, Industrial wastes, Municipal wastes, Oil spills, Water sampling, Data collections, Chemical analysis, Heavy metals, Pesticides, Nutrients, Reviews.
Identifiers: *Mediterranean Sea, Symposium.

La Commission Internationale pour l'Exploration Scientifique de la mar Mediterranee (CIESM) was founded in 1910 by Prince Rainier I, of Monaco. The current president is the present Prince of Monaco, Rainier III. A 2-day session on Marine Pollution preceded the Plenary Congress of CIESM, held in Athens in November 1972. About 40 papers dealing with various aspects of pollution in the Mediterranean were given. Presentations are listed and those which seemed particularly interesting are discussed. A mildly optimistic prognosis is given for pollution research in the Mediterranean. (Woodard-USGS)
W74-00543

SUMMARY OF CHEMICAL AND RADIOCHEMICAL MONITORING OF WATER FOR THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, FISCAL YEAR 1972,
Geological Survey, Lakewood, Colo.
L. J. Schroder, and W. C. Ballance.
Available from NTIS, Springfield, Va. 22151 USGS-474-167 Price $4.00 printed copy; $1.45 microfiche. Contract Report USGS-474-167, 1973. 39 p, 5 fig, 6 tab, 8 ref. AEC Contract AT (49-16)-3002.

Descriptors: *Nuclear explosion, *Underground, *Alaska, *Water analysis, *Pollutant identification, Chemical analysis, Tritium, Nuclear meters, Radioactivity, Dissolved solids, Sampling, Correlation analysis, Data collections, Radiochemical analysis.
Identifiers: *Amchitka Island (Alaska), Cannikin event, Gross beta/gamma activity.

Amchitka Island, Alaska, was the site for three underground nuclear detonations. The Long Shot event was conducted on October 29, 1965, the Milrow event on October 2, 1969, and the Cannikin event on November 6, 1971. This report is concerned with the Cannikin event. An increased dissolved-solids content was found immediately after the Cannikin event at most of 10 locations in a water-sampling network established in 1967 and revised in September 1971. The observed dissolved-solids content increase was within the seasonal range that has been observed at these locations. No measureable increase in radioactivity was detected as a result of the Cannikin event at the 72 locations monitored during fiscal year 1972. A measurable increase in gross beta/gamma activity was found in January 1972 which was correlated to a surface test of a nuclear device by a foreign nation. (Woodard-USGS)
W74-00547

5C. Effects of Pollution

TRITIUM PRODUCTION.
For primary bibliographic entry see Field 05B.
W74-00009

KINETICS OF TRITIUM IN BIOLOGICAL SYSTEMS.
For primary bibliographic entry see Field 05B.
W74-00011

CERTAIN ENVIRONMENTAL ASPECTS OF TRITIUM.
For primary bibliographic entry see Field 05B.
W74-00012

LAND RECLAMATION AND RIVER POLLUTION PROBLEMS IN THE CROAL VALLEY CAUSED BY WASTE FROM CHROMATE MANUFACTURE,
Liverpool Univ. (England). Dept. of Botany.
V. G. Breeze.
Journal of Applied Ecology, Vol 10, No 2, p 513-525, August 1973. 1 fig, 8 tab, 20 ref.

Descriptors: *Toxicity, *Chromium, *Industrial wastes, Surface runoff, *Aquatic plants, *Land reclamation, *Leaching, Heavy metals, Water pollution effects, Algae, Plants, Chromates, Soils, Chrysophyta.
Identifiers: Gomphonema parvulum, Navicula cryptocephala, Navicula viridula, Navicula radiosa, Navicula cincta, Navicula rhynchocephala, Achnanthes minutissima, Elodea canadensis, *United Kingdom (Croal River).

Wastes resulting from chromate manufacture have had toxic effects on the disposal area, and runoff from the waste have had severe effects on river flora. Toxicity studies were conducted with plants grown on the waste overlayed with soil. Composition of soluble portions of the waste was determined by progressively dissolving the material in increasing amounts of acid. An indication of the composition could be obtained from the elements which appeared in solution. Toxicity was also studied with seeds placed in Petri dishes containing solutions of chromic sulfate or potassium dichromate dissolved in water and with soil samples treated with the chemicals. The waste was toxic to plants even when diluted seven times with soil. Layers of soil over the waste are only successful if deep, due to upward diffusion of highly toxic chromate ions. Chromic ions in soil are much less toxic as chromic hydroxide and organic complexes are formed (and not because chromate is more toxic as has previously been reported). This suggests that reclamation could be achieved by chemically reducing the chromate in the waste. The waste causes serious river pollution due to leaching of chromate, but successful reclamation would lessen this. Chemical reduction of the chromate entering the river could also be beneficial as chromic ions are more rapidly lost from solution in river water. (Little-Battelle)
W74-00045

EFFECTS OF ARTIFICIAL AERATION ON THE CHEMISTRY AND ALGAE OF TWO MICHIGAN LAKES,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
A. W. Fast, B. Moss, and R. G. Wetzel.
Water Resources Research, Vol 9, No 3, p 624-647, June 1973. 1 fig, 28 ref.

Descriptors: *Primary productivity, Water chemistry, *Aquatic algae, *Environmental effects, Water properties, Mixing, Nutrients, Phytoplankton, Periphyton, Water analysis, Thermal stratification, Destratification, *Aeration, Water sampling, Dissolved oxygen, Carbon dioxide, Alkalinity, Conductivity, Calcium, Magnesium, Potassium, Sodium, Phosphorus, Nitrogen, Mercury, Chemical analysis, Aquatic soils, Hypolimnion, Standing crops, Alkali metals, Alkaline earth metals, *Michigan, Chemical properties, Physical properties, Epilimnion, Lake sediments.
Identifiers: Artificial aeration, *Section Four Lake (Mich), *Hemlock Lake (Mich), Organic carbon, Particulate organic carbon, Dissolved organic carbon, Total organic carbon.

In order to determine the effect of artificial aeration in lakes, an unproductive hard water lake (Section Four Lake) and an eutrophic lake (Hemlock Lake) were artifically aerated using compressed air. Section Four Lake was completely mixed whereas Hemlock Lake had its hypolimnion aerated but thermal stratification maintained. Water samples were collected with a PVC Van Dorn sampler and determinations were made for dissolved oxygen, carbon dioxide, pH, total alkalinity, conductivity, total dissolved organic carbon, total particulate organic carbon, Ca, Mg, K, and Na. Total carbon content of the sediment was also measured. Foam samples were analyzed for total P, N, and Hg. Primary productivity estimates were made, and phytoplankton and periphyton samples were analyzed. Chemical and algal changes in Section Four Lake during destratification were not great. Although phytoplanktonic production potentials increased during mixing, the phytoplankton standing crop appeared to decline slightly, possibly due to the increased mixing depth and turbidity. Hemlock Lake hypolimnetic anoxia and conditions associated with it were eliminated during aeration. The lake gradually destratified during aeration due to leaks in the aeration tower. These leaks also released nutrient rich water into the epilimnion, which promoted algal growth. (Holoman-Battelle)
W74-00048

PHOTODECOMPOSITION OF THE HERBICIDE METHAZOLE,
Kentucky Univ., Lexington. Dept. of Entomology.
For primary bibliographic entry see Field 05B.
W74-00050

POLYCHLORINATED TERPHENYLS IN THE ENVIRONMENT,
Rijksinstituut voor de Volksgizondheid, Utrecht (Netherlands). Lab. of Toxicology.
For primary bibliographic entry see Field 05A.
W74-00057

A SIMPLIFIED CLEAN-UP TECHNIQUE FOR ORGANOCHLORINE RESIDUES AT THE MICROLITER LEVEL,
Lund Univ. (Sweden). Dept. of Animal Ecology.
For primary bibliographic entry see Field 05A.
W74-00058

GAS CHROMATOGRAPHIC PROCEDURE TO ANALYZE AMINO ACIDS IN LAKE WATERS,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05A.
W74-00061

A REVIEW OF OUTBOARD MOTOR EFFECTS ON THE AQUATIC ENVIRONMENT,
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
T. P. Jackivicz, Jr., and L. N. Kuzminski.
Journal Water Pollution Control Federation, Vol 45, No 8, p 1759-1770, August 1973. 2 fig, 6 tab, 50 ref.

Descriptors: Aquatic environment, *Water pollution sources, *Water pollution effects, *Reviews, Pollutants, Boats, Organic compounds, Lead, Phenols, Water pollution, Water quality, Oil, Boating, Biochemical oxygen demand, Chemical oxygen demand, Heavy metals.
Identifiers: *Watercraft, Two-stroke outboard motors, Engine exhausts, Crackcase drainage, Exhaust emissions, Motor fuel, *Outboard motors, Operation efficiency.

Various aspects of outboard motor operation, including the magnitude of watercraft usage, operation and efficiency of a two-cycle engine, composition of outboard motor fuels, and compounds emitted during operation are reviewed. Compounds emitted to receiving waters originate from drainage of crankcase liquids and from unburned fuel passing through the combustion chamber. Over half the original fuel mixture for outboard motors may be emitted unburned into receiving waters. Factors affecting the quantity of compounds exhausted from outboard motors include horsepower rating, crankcase size, composition of fuel mixture, tuning of the engine, and speed of operation. Some of the compounds measured in water contaminated by motor exhaust include volatile and nonvolatile oil, lead and phenols. (Holoman-Battelle)
W74-00063

SOME CONSIDERATIONS OF THE CHEMICAL LIMNOLOGY OF MEROMICTIC LAKE MARY,
Wisconsin Univ., Madison. Water Chemistry Program.
W. C. Weimer, and G. F. Lee.
Limnology and Oceanography, Vol 18, No 3, p 414-425, May 1973. 5 fig, 4 tab, 30 ref.

Descriptors: *Meromixis, Water analysis, Water pollution effects, Trophic level, Water quality, Water sampling, Water chemistry, Water temperature, Dissolved oxygen, Turbidity, Color, Hydrogen ion concentration, Specific conductivity, Alkalinity, Sulfides, Methane, Chlorides, Sodium, Potassium, Calcium, Magnesium, Sulfates, Iron, Dissolved solids, Suspended solids, Chemical oxygen demand, Ammonia, Nitrates, Nitrites, Phosphates, Hydrogen sulfide, Nutrients, *Wisconsin, Sampling, Colorimetry.
Identifiers: *Lake Mary (Wis.), Characterization, *Chemical limnology, Chemical composition, Lake Rose, Orthophosphates, Sample preservation, Sample preparation, Atomic absorption spectrophotometry.

Meromictic Lake Mary was studied and compared with dimictic Lake Rose to evaluate the relative roles of several chemical species to determine the species of primary importance in promoting or maintaining meromixis. The approach involved detailed analyses of the dominant ionic species in the distinct layers of the lakes. Analyses included: temperature, DO, transparency, true color, pH, specific conductance, alkalinity, sulfide, methane, chloride, Na, K, Ca, Mg, sulfate, Fe, dissolved and suspended solids, COD, ammonia, nitrate, nitrite, phosphate, orthophosphate, and hydrogen sulfide. Both lakes exhibited similar seasonal variations in their chemical composition. The chemical composition of the monimolimnetic waters of Lake Mary did not vary throughout the 21-month study. Methane production in Lake Rose began soon after thermal stratification and concentrations in the anoxic hypolimnion reached about 14 mg/liter. Methane concentrations in the Lake Mary monimolimnion increased with depth and ranged up to 21 mg/liter. The concentration and vertical distribution of CH_4, together with an alkalinity increase of 22 mg/liter above that in the surface waters and an NH_4 (plus) increase of 4.2 mg/liter, indicated that biological activity helps sustain the meromixis of Lake Mary. However, the major factor allowing meromixis is the morphometry of the lake basin. (Little-Battelle)
W74-00064

NUTRIENT FACTORS LIMITING PRIMARY PRODUCTIVITY IN SIMULATED AND FIELD ANTARCTIC MICROECOSYSTEMS,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
G. L. Samsel, Jr., and B. C. Parker.
Va J Sci. Vol 23, No 2, p 64-71, 1972. Illus.
Identifiers: Ammonia, *Antarctic, Carbon-14, Chlorides, Ecosystems, Ecosystems, Iron, Nitrates, *Nutrients, Phosphates, *Primary productivity, Silicates.

Compared both in laboratory microecosystems and under natural field conditions, were the effects of selected nutrient enrichments on the algal communities of 2 closely associated Antarctic

lakes to discover which inorganic nutrients might most likely be responsible for the observed 'trophic' differences between them. Laboratory aquatic microecosystems simulating both lakes were established in several types of containers with living microbial communities from both lakes. Effects of enrichments with ammonia, phosphate, nitrate, silicate, Fe, and chloride singly and in combinations were examined periodically for 30-40 days, by evaluating photosynthetic 14C uptake rates by phytoplankton. Ammonia was the principal nutrient causing the differences in primary productivity. Phosphate also induced a small but significant stimulation of primary productivity, especially in combination with ammonia. Other enrichments were ineffective. Field enrichment studies, although conducted during a second season, essentially confirm laboratory results.--Copyright 1973, Biological Abstracts, Inc.
W74-00069

SEASONAL VARIATIONS IN SELECTED PHYSICOCHEMICAL CONDITIONS OF A SMALL LAKE IN BRAZOS COUNTY, TEXAS,
Texas Water Quality Board, Austin.
For primary bibliographic entry see Field 02H.
W74-00074

QUALITATIVE AND QUANTITATIVE VARIATION OF NET PLANKTON OF CRAIGHEAD LAKE,
Oklahoma State Univ., Stillwater. Dept. of Entomology.
For primary bibliographic entry see Field 02H.
W74-00075

CHANGES IN FAUNA OF WATER MITES (HYDRACARINA) OF KIERSKIE LAKE, (IN POLISH),
Polish Academy of Sciences, Poznan. Inst. of Zoology.
E. Biesiadka.
Pol Pismo Entomol. Vol 42, No 2, p 263-271, 1972. English summary.
Identifiers: *Eutrophication, Fauna, Hydracarina, Lakes, *Poland (Kierskie Lake), *Water mites.

The water mite fauna of Kierskie Lake (near Poznan, Poland) is compared with the one investigated by Tutaj (1936) about 40 yr ago. There were 36 spp. and sspp. not recorded by Tutaj. The occurrence of 12 spp. of the 27 found in this lake by Tutaj was not confirmed. There were considerable differences in the abundance of particular species. These changes may be related to progressive eutrophication of the Kierskie Lake and its growing sport and tourist exploitation.--Copyright 1973, Biological Abstracts, Inc.
W74-00078

METHYLMERCURY AS PERCENTAGE OF TOTAL MERCURY IN FLESH AND VISCERA OF SALMON AND SEA TROUT OF VARIOUS AGES,
National Swedish Food Administration, Stockholm. Food Lab.
G. Westoo.
Science, Vol 181, No 4099, p 567-568, August 10, 1973. 1 tab, 5 ref.

Descriptors: *Gas chromatography, *Neutron activation analysis, Marine fish, Atlantic salmon, Mercury, Heavy metals, Age, *Salmon, *Pollutant identification.
Identifiers: *Methylmercury, Biological samples, *Sea trout, Tissue, Viscera, Salmo salar, Salmo ocla, Sweden.

Salmon (Salmo salar) and sea trout (S. ocla) of various ages were analyzed for total mercury by neutron activation analysis and for methylmercury by gas chromatography. The purpose was to determine whether the proportion of methylmercury was related to the age of the fish. Methylmercury in salmon 1 to 7 years old and in sea trout 1 and 2 years old averaged 93 percent and was independent of age. In both species 1 and 2 years old, methylmercury constituted 26 to 27 percent of the total visceral mercury independent of age. (Little-Battelle)
W74-00079

METHOD FOR CONTROLLING ALGAE POLLUTION,
Kettering Scientific Research, Inc., Yellow Springs, Ohio. (Assignee)
For primary bibliographic entry see Field 05G.
W74-00088

EFFECTS OF WATERSHED DEVELOPMENT ON WATER QUALITY,
Tennessee Valley Authority, Chattanooga. Water Quality Branch.
R. Ruane, and E. G. Fruh.
Journal of American Water Works Association, Vol 65, No 5, p 358-363, May 1973. 12 fig, 4 tab, 6 ref.

Descriptors: *Analytical techniques, *Urban impact, *Water quality, *Water pollution control, Testing procedure, Evaluation, Watershed management, Urbanization, Urban drainage, Impoundments, Bacteria, Water purification, Water supply, Watersheds (Basins), Water treatment, Measurement, *Texas.
Identifiers: Austin (Tex).

Water treatment plants continuously measure a variety of water quality characteristics of the raw water they use. Thus, the plants are a 'water-quality monitor' for their sources of water. A review of the records for two water treatment plants on the Colorado River in Austin, Texas, is presented. One of the two plants has been in operation since 1924; the records for it show how construction of several impoundments upstream from Austin have affected water quality and also how water quality has deteriorated in recent years as a result of increased urbanization. The investigation also revealed the following: bacterial concentrations increased significantly in the river immediately following the construction of upstream impoundments; bacterial concentrations in the river are generally increasing, indicating the effects of increased population and urbanization; and the water quality in the plant serving the more urbanized area was less desirable than that in the other plant. (McKnight-Florida)
W74-00118

EFFECT OF RIVER DISCHARGE REGULATION ON THE LOWER DON PHYTOPLANKTON, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
E. I. Aksenova.
Gidrobiol Zh. Vol 8, No 3, p 34-38. 1972. Illus. (English summary).
Identifiers: Bacillariophyta, Chlorophyta, Chrysophyta, Cyanophyta, Discharge, Euglenophyta, *Phytoplankton, *Regulation, River, Species, *USSR (Lower Don River).

As a result of the river discharge regulation, essential changes took place in the composition and quantitative development of phytoplankton of the Lower Don (USSR). Its taxonomic composition was enriched by new species and genera of Cyanophyta, Chrysophyta, Bacillariophyta, Euglenophyta and Chlorophyta typical of the lakes and reservoirs. Quantitative changes were expressed in a sharp increase of the quantity of all groups of algae, especially Cyanophyta. An average number of algae for the vegetative period had a 17-fold increase, Cyanophyta had a 33-fold increase. A leading role in the plankton passed from Bacillariophyta and Chlorophyta to Cyanophyta.--Copyright 1973, Biological Abstracts, Inc.
W74-00120

DISTRIBUTION OF PEAT BOGS ON EARTH, THEIR TYPES AND CHARACTERISTICS, (IN RUSSIAN),
For primary bibliographic entry see Field 02H.
W74-00147

NITROGEN SOURCES AND CYCLING IN NATURAL WATERS,
Florida Univ., Gainesville. Dept. of Environmental Engineering.
P. L. Brezonik.
Copy available from GPO Sup Doc as EPI.23:660-73-002, $2.35; microfiche from NTIS as PB-224 491, $1.45. Environmental Protection Agency, Ecological Research Series, EPA-660/3-73-002, July 1973. 167 p, 42 fig, 31 tab, 190 ref. EPA Project 16010 DCK.

Descriptors: *Eutrophication, Limnology, *Nutrients, *Nitrogen fixation, *Cyanophyto, Water quality, Trophic level, Algae, Bacteria, *Florida, Lakes, Phosphorus, *Lake sediments, *Nitrogen cycle, Ammonia, Organic loading, Hypolimnon.
Identifiers: Waccassa Estuary (Fla), Acetylene reduction, Anoxic hypolimnon.

Sources of nitrogen were reviewed to determine their significance in lake nitrogen budgets. Nutrients in rainfall were evaluated and found to be significant. Nitrogen and phosphorus budgets were calculated for 55 Florida lakes and critical loading rates established by comparing calculated budgets with data on trophic state. Nitrogen fixation by Cyanophyceae was studied in detail in two eutrophic Florida lakes for one year. Also a survey of fixation in Florida lakes was conducted and fixation found only in eutrophic lakes. Bacterial fixation was found to contribute significant nitrogen to the anoxic hypolimnon of a small stratified lake. Nitrogen fixation was found in both lacustrine and estuarine sediments. Sediments of 55 lakes were characterized chemically and results suggest that such sediment may act as an ammonia buffer, sorbing ammonia at high concentrations and releasing it to ammonia depleted water. Estuarine sediment absorbed ammonia strongly but failed to release it to overlying water. The acetylene reduction assay for nitrogen fixation was evaluated. Interferences in automated nutrient determinations due to organic color were studied and simple color correction found for nitrite, nitrate and orthophosphate but not ammonia as determined by the indophenol method. Amino acids also interfered with the ammonia analysis. (EPA)
W74-00149

WEED HARVEST AND LAKE NUTRIENT DYNAMICS,
North Dakota Univ., Grand Forks. Dept. of Biology.
J. K. Neel, S. A. Peterson, and W. L. Smith.
Copy available from GPO Sup Doc as EPI.23:660-73-001, $1.25; microfiche from NTIS as PB-224 492, $1.45. Environmental Protection Agency, Ecological Research Series, Report EPA-660/3-73-001, July 1973. 91 p, 26 fig, 9 tab, 30 ref. EPA Project 16010 DFI.

Descriptors: *Minnesota, *Eutrophication, *Nutrients, Nutrient requirements, Water pollution, Sediments, Biota, Weed control, *Nutrient removal, *Algal control, Diatoms, Cyanophyta, Chlorophyta, Nitrogen, Phosphorus.
Identifiers: Pelican River (Minn), *Weed harvester, Watershed pollution, *Lake Sallie (Minn).

After more than sixty years of cultural eutrophication, Lake Sallie, Minnesota, supports dense growths of phytoplankton and rooted vegetation.

Its major water mass has the chemical character imparted by photosynthesis at all seasons, and chemical effects of decomposition are rather localized. Phytoplankton dominance alternates among diatoms, blue-green, and green algae in that order of abundance. Prior to operation of a week harvester, attached plants grew densely over 34% of the bottom area. The bulk of nitrogen and phosphorus is usually contained in the water mass, with noticeably smaller amounts in upper bottom sediments and biota. The fish population, less than one half of the mass of weeds, contained considerable more N and P than weeds in 1971. Harvest in 1970 evidently reduced weed density in 1971, and increased the cost per unit of nutrients removed. Nitrogen and phosphorus removed in weeds were insignificant when compared with annual water borne waste effluent contributions to the lake. Cost of phosphorus removal by weed harvest was $61 and $199 per pound in 1970 and 1971, respectively; nitrogen cost $8 and $21 and carbon $0.64 and $1.62 per pound for the same two years. (EPA)
W74-00150

RATES OF PHOTOSYNTHESIS AND PHYTOPLANKTON GROWTH IN SHAGAWA LAKE, MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
R. O. Megard.
Copy available from GPO Sup Doc as EP1.23:73-039, $0.95; microfiche from NTIS as PB-224 462, $1.45. Environmental Protection Agency, Ecological Research Series, Report EPA-R3-73-039, July 1973. 69 p, 10 fig, 13 tab, 42 ref. EPA Project 16010 DEG.

Descriptors: *Phytoplankton, *Photosynthesis, Phosphorus, Lakes, *Eutrophication, Aquatic algae, Nutrients, Water pollution effects, *Minnesota.
Identifiers: Lake pollution, *Shagawa Lake (Minn), *Aphanizomenon.

Integral photosynthetic rates and growth rates of phytoplankton were measured before, during, and after a bloom of Aphanizomenon, which occurred in August 1970. The size of the population increased during the bloom despite decreasing specific production rates, probably because the dominant algal became more buoyant and decreased its sinking rate. The effects of changing the specific production rates and specific loss rates are demonstrated by comparing the integral photosynthetic rates and chlorophyll concentrations that would prevail under steady state conditions. (EPA)
W74-00151

EUTROPHICATION RESEARCH APPLIED TO WATER QUALITY MANAGEMENT ON THE GREAT LAKES,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 10A.
W74-00205

PARASITES, DISEASE, AND DISEASE CONTROL OF GREAT LAKES ANADROMOUS AND COMMERCIAL FISH,
Michigan Dept. of Natural Resources, Lansing.
L. N. Allison.
Available from the National Technical Information Service as COM-72-11250, $3.00 in paper copy, $1.45 in microfiche. Prepared for National Marine Fisheries Service, Completion Report NOAA-72091928, December 1971. 133 p, 3 fig, 19 tab, 35 ref. AFC-7.

Descriptors: *Fish diseases, *Fish parasites, *Pest control, *Michigan, Anadromous fish, Commercial fish, Fish hatcheries, Brook trout, Brown trout, Salmon, Fungicides, Anthelminthes (Pesticides), Rainbow trout, Perches, Bacteria, Fish diets, Parasitism, Pathogenic fungi, Chinook salmon, Antibiotics (Pesticides).
Identifiers: Redworm, Yellow grub, Gill lice, Furunculosis, Tapeworms, Whirling disease, Drugs, Alewives, Gill disease, Ortho Diquat, Hyamine 1622, Dexon, Di-n-butyl tin oxide, Tylosin Lactate, Acanthocephala, Kidney disease, White spot, Pyridylmercuric acetate.

Fish diseases, fish parasites and hatchery techniques were studied at the Grayling Research Station of the Michigan Department of Conservation. A nutrition study of six commercially made pellets was made on rainbow trout fingerlings. Several commercial trout diets were compared and determination made of those giving superior results in Michigan hatcheries. Material was compiled into a guideline for regulating and controlling importation of fish and eggs into the state. A program was started to eradicate an uncontrollable protozoan disease called 'Whirling disease' caused by Myxosoma cerebralis, and another to develop brook trout and brown trout that are resistant to furunculosis. A screening program was conducted for a drug or drugs which can be fed in the normal hatchery diet to control external parasites on trout and to work out details of the most effective dosage and daily feeding schedule. Regarding residual drugs in hatchery trout, an attempt was made to clear pyridylmercuric acetate with the Federal Food and Drug Administration for therapy of gill disease and certain external parasites of hatchery salmonids to prevent serious mortalities. Several lots of eggs from infected coho salmon were treated with Thimersol, Acriflavine, and Terramycin, respectively, to study residual bactericidal activity. (Jones-Wisconsin)
W74-00229

SOME BIOLOGICAL ASPECTS OF CHANNEL CATFISH VIRUS DISEASE,
Auburn Univ., Ala.
J. A. Plumb.
Available from the National Technical Information Service as COM-72-11301, $3.00 in paper copy, $1.45 in microfiche. Ph D Thesis supported by National Marine Fisheries Service, Report NOAA-72091907, June 1972. 130 p, 13 fig, 17 tab, 57 ref. 2-151-R.

Descriptors: *Fish diseases, *Channel catfish, *Viruses, *Epizootiology, Assay, Electron microscopy, Water temperature, Vectors (Biological), Mortality, *Arkansas.
Identifiers: Mammoth Spring Hatchery (Ark).

History, distribution and epizootiology of Channel Catfish Virus Disease are discussed. This highly virulent, communicable virus has been isolated from 23 channel catfish fingerling epizootics in nine states with 61% of the cases coming from commercial channel catfish operations. It must be assumed, until proven otherwise, that once channel catfish are exposed to the virus, they are potential virus carriers and may transmit the disease to their offspring or other susceptible fish. All efforts to isolate virus from tissues of suspected adult carrier fish have failed even though the presence of strong neutralizing antibody in these fish indicated that they had been previously exposed. A total of 298 organ, tissue or excretory product samples were assayed from 62 adult fish. The virus was not recovered from any of these samples even though the fish had produced virus-infected offspring in previous years. The kidney, liver and intestine of virus injected fingerling channel catfish are primary organs of infection. In experimentally infected fingerling channel catfish a temperature reduction from 27-28C to 18-19C 24 hours after infection reduced mortality 60-80% and 5-35% when temperature was reduced on appearance of clinical signs of the disease. (Jones-Wisconsin)
W74-00231

EFFECTS OF UNDERWATER DEMOLITION ON THE ENVIRONMENT IN A SMALL TROPICAL MARINE COVE,
Naval Underwater Systems Center, New London, Conn. New London Lab.
C. L. Brown, Jr., and R. H. Smith.
Available from the National Technical Information Service as AD-754 395. Technical Report 4459, December 1972. 18 p, 7 fig, 4 ref. A-626-11.

Descriptors: *Explosives, *Underwater, *Environmental effects, Excavation, Marine biology, Bays, *Puerto Rico, Sound waves.
Identifiers: *Cross Cay (P.R.).

Use of 4000 lb of explosives in a small cove on Cross Cay, off Puerto Rico, to clear a beach area for an access road and remove underwater and awash coral heads and boulders to create a boat lane, prompted assessment of the blasting impact on the environment and measurement of the acoustic-pressure levels and effect of the demolition on marine life. By positioning the charges, a large portion of the energy was dissipated skyward. As a result of the precautions taken to minimize damage to the environment, at a distance of 350 yd from the demolition area, the largest of the three blasts produced a pressure level of only 9.15 lbf/sq in. The prediction of a shadow-zone effect was apparently correct, since, in the deeper water outside the cove, very little damage was noticeable--only three dead fish were found. Within two hours after the last and most powerful explosion, schools of fish were observed in that area. On the following day, more fish were in the cove, indicating that the area could be recolonized in a short time. (Jones-Wisconsin)
W74-00233

MUTATIONS ARISING DURING TRANSFORMATION IN THE BLUE-GREEN ALGA ANACYSTIS NIDULANS,
Liverpool Univ. (England). Dept. of Biochemistry.
M. Herdman.
Molecular and General Genetics, Vol 120, No 4, p 369-378, 1973. 4 tab, 15 ref.

Descriptors: *Genetics, *Cyanophyta, Aquatic plants, *Algae.
Identifiers: *Anacystis nidulans, *Mutations, Procaryotic organisms, DNA.

The blue-green algae comprise a large, structurally and physiologically diverse, group of procaryotic organisms whose genetics, in contrast to the bacteria, have been scarcely examined. Genetic transformation of Anacystis nidulans is described and evidence provided that genetic recombination is associated, at high frequency, with mutation. Donor material was used from two sources, namely chemically extracted DNA and extracellular nucleic acids. A high proportion of the transformants became mutant at sites which were wild type in both parental strains. Linkage was less extensive in transformation mediated by chemically extracted DNA, and this increased frequency of recombination was associated with enhanced mutation frequencies. The frequencies of recombination and mutation were varied to the same extent by changing the DNA concentration, and both processes were prevented by pretreatment of donor DNA with DNase. Mutational events are, therefore, closely associated with recombination in A. nidulans. The mutations are revertible and are therefore not deletions. If the mechanism of this mutational process in A. nidulans is similar to that in other organisms, then the high frequency of the phenomenon in this organism may greatly facilitate further study of the nature of this mutagenic step in recombination. (Jones-Wisconsin)
W74-00234

CO2 FIXATION BY THE BLUE-GREEN ALGA ANACYSTIS NIDULANS,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biochemistry.
E. R. Jansz, and F. I. Maclean.

Canadian Journal of Microbiology, Vol 19, No 4, p 497-504, 1973. 7 tab, 26 ref.

Descriptors: *Carbon cycle, *Carbon dioxide, *Cyanophyta, Biochemistry, Cytological studies, Enzymes, Amino acids, Photosynthesis.
Identifiers: *Anacystis nidulans, *Carbon dioxide fixation, Carboxylation, Transcarboxylation.

Route of carbon dioxide fixation was investigated by examining early products of carbon dioxide fixation in Anacystis nidulans, and by investigating in cell extracts possibilities for carboxylation and transcarboxylation reactions. Two types of patterns were observed: In type I fixation 3-phosphoglycerate was the most heavily labeled initial product and in type II fixation the most intensely labeled initial product was aspartate. In type II patterns the bulk of the label in aspartate was in C4 suggesting a carboxylation of phosphoenolpyruvate. C14 incorporation into oxaloacetate was found much less than into aspartate. Ribulose-1,5-diphosphate carboxylase activity (sufficient to account for 20% manometric photosynthesis rates) and phosphoenolpyruvate carboxylase activity (sufficient to account for whole-cell rates of aspartate synthesis) were observed in cell-free extracts. Phosphoenolpyruvate-stimulated carboxylation of ribulose diphosphate was not detected indicating the label in aspartate was not a reflection of a pathway involving transcarboxylation of oxaloacetic acid. Early label detected in glutamate-1-C14 probably arose from oxaloacetate-4-C14 via citric acid cycle rather than by reductive carboxylation of succinic acid as a-ketoglutarate synthetase activity was not detected in extracts. Calvin cycle was the major route of carbon dioxide fixation. A second, minor path was carboxylation of phosphoenolpyruvate. (Jones-Wisconsin)
W74-00236

LIMITING STEPS IN PHOTOSYSTEM II AND WATER DECOMPOSITION IN CHLORELLA AND SPINACH CHLOROPLASTS,
Institut de Biologie Physico-Chimique, Paris (France).
B. Bouges-Bocquet.
Biochimica et Biophysica Acta, Vol 292, No 3, p 772-785, 1973. 7 fig, 18 ref.

Descriptors: *Photoactivation, *Biochemistry, *Chlorella, Photosynthesis, Activation energy, Chemical reactions.
Identifiers: *Chloroplasts, Photosystem II.

During water decomposition and oxygen evolution performed by Photosystem II in green plants, it has been shown that four consecutive photochemical reactions per center are necessary for an oxygen molecule production. States refer to the general state of a center which comprises its oxidizing and reducing sides, and differs according to the number of charges stored on the oxidizing side of Photosystem II. During a short flash a photochemically inactive state is formed. A dark reaction leads to the photochemically active state. During a short saturating flash, each photochemical center reacts once and only once. Only states So and Sl are stable in the dark where there is an equilibrium between So and Sl. New results with regard to this equilibrium are presented which provide a useful tool for study of reactions. By varying redox potential of a chloroplast suspension, new evidence was obtained for an equilibrium between state So and Sl. Limiting steps between two consecutive photoreactions of System II in Chlorella and spinach chloroplasts and the limiting steps in the presence of low concentration of hydroxylamine were studied. Results favor the binding of two molecules of hydroxylamine to every photochemical center. (Jones-Wisconsin)
W74-00238

THE EFFECTS OF CARBON DIOXIDE CONCENTRATION ON OXYGEN EVOLUTION AND FLUORESCENCE TRANSIENTS IN SYNCHRONOUS CULTURES OF CHLORELLA PYRENOIDOSA,
Rochester Univ., N.Y. Dept. of Biology.
R. E. Slovacek, and T. T. Bannister.
Biochimica et Biophysica Acta, Vol 292, No 3, p 729-740, 1973. 8 fig, 27 ref.

Descriptors: Biochemistry, *Photosynthesis, *Carbon dioxide, *Fluorescence, Chlorella, *Photosynthetic oxygen, Chlorophyll, Bioluminescence, Cytological studies.
Identifiers: *Fluorescence transients, *Chlorella pyrenoidosa, Electron transport.

A new example of parallelism of electron transport and fluorescence is added in which parallelism is manifested not only in the steady-state (fluorescence and oxygen evolution declining together as CO2 concentration falls), but also during induction (both oxygen evolution and fluorescence first increasing in the M2-P3 phase, then falling during the P3-S phase). Steady-state fluorescence yield of Chlorella pyrenoidosa is strongly affected by carbon dioxide concentration, being approximately two-fold higher in presence than in absence of carbon dioxide. In the presence of saturating carbon dioxide during induction, accelerating oxygen evolution is paralleled by rising fluorescence; in the absence of carbon dioxide, fluorescence yield remains at low level. Both illumination and carbon dioxide content are important in determining the steady-state fluorescence yield: at lower illuminations, lower concentrations of carbon dioxide are required to obtain a maximum fluorescence yield. The effects of carbon dioxide on induction in 16-hour cells are shown. The carbon-dioxide dependent fluorescence rise is most readily observed in cells harvested early in the light period of a synchronous culture, but it can also be elicited in cells harvested during the dark period. Addition of DCMU to carbon dioxide-deprived cells raises the fluorescence yield approximately four-fold. (Jones-Wisconsin)
W74-00239

THE AMINO ACID AND SUGAR COMPOSITION OF DIATOM CELL-WALLS,
Woods Hole Oceanographic Institution, Mass.
R. E. Hecky, K. Mopper, P. Kilham, and E. T. Degens.
Marine Biology, Vol 19, No 4, p 323-331, 1973. 3 fig, 3 tab, 29 ref.

Descriptors: *Silica, Biochemistry, *Cytological studies, *Diatoms, *Amino acids, Carbohydrates, Evolution.
Identifiers: *Silicification.

Knowledge of the chemical composition of the organic coating of diatom cell walls may clarify the silicification mechanism. Studies of the cell wall composition may offer a new approach to diatom taxonomy and evolution if the cell wall constituents are as variable as the frustule microstructure, now the basis of diatom systematics. Understanding molecular nature of this organic coating and its probable fate in aquatic and sedimentary environments has important consequences for the geochemical cycle of silica and for paleoecological studies. Amino acid and sugar composition of cell walls from six diatom species are described. Species were selected on the basis of taxonomic and habitat diversity, as well as availability in culture. When compared to cellular protein, cell-wall protein is enriched in serine plus threonine and glycine, and depleted in acidic, sulfur-containing and aromatic amino acids. Sugars of the cell-wall carbohydrates are quite variable, and fucose tends to replace glucose in estuarine species. Condensation of silicic acid, in epitaxial order, on a protein template enriched in serine and threonine, is suggested as the Si-depositing mechanism. Nature of this template and polysaccharides in the cell wall may determine diatom frustule solubility in various environments. (Jones-Wisconsin)
W74-00240

EFFECTS OF ARTIFICIAL DESTRATIFICATION ON ZOOPLANKTON IN PARVIN LAKE, COLORADO,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
R. T. Lackey.
Transactions of American Fisheries Society, Vol 102, No 2, p 450-452, 1973. 1 tab, 8 ref.

Descriptors: *Destratification, *Zooplankton, *Colorado, Crustaceans, Daphnia, Rotifers, Copepods, Spatial distribution, Water management (Applied).
Identifiers: *Parvin Lake (Colo.), Daphnia schodleri, Diaptomus.

Lake destratification is becoming an increasingly common tool in attempts to solve certain water management problems, but effects on biological components have been poorly defined. Effects of destratification on zooplankton abundance and depth distribution of Parvin Lake, Colorado, are described. This lake, a 19 ha montane reservoir, was artificially destratified for one year. The study consisted of a control year (November 1968-October 1969) and a treatment year (November 1969-October 1970). During the treatment year the destratification system was in continuous operation. Zooplankton was sampled at three stations: the deepest part of the lake (10m), the 6-m contour, and the 2-m contour. Horizontal differences in abundance between stations were not detected by initial data analysis, so counts for a given stratum were averaged. From these average values, a lake mean for each taxon was calculated. Abundance of cladocerans (collectively) was lower during winter months and higher during summer months of the destratification year. Abundance of copepods (mainly Diaptomus spp.) was not statistically different during destratification. Depth distribution of zooplankton was generally unaffected, but Diaptomus tended to occur in deeper water during the destratification year. (Jones-Wisconsin)
W74-00243

LAKE HURON: EFFECTS OF EXPLOITATION, INTRODUCTIONS, AND EUTROPHICATION ON THE SALMOID COMMUNITY,
Department of Lands and Forests, Maple (Ontario). Research Branch.
A. H. Berst, and G. R. Spangler.
Journal Fisheries Research Board of Canada, Vol 29, No 6, p 877-887, 1972. 8 fig, 27 ref.

Descriptors: *Fish populations, *Lake Huron, *Fish harvest, *Salmonids, Commercial fishing, Fish food organisms, Water pollution effects, Pollutants, Nets, Sport fish, Lake fisheries, Lake trout, Chinook salmon, White bass, Competition, Walleye, Predation, Thermal pollution, Exploitation, Cisco, Suckers, Yellow perch, Carp, Sauger, Pikes, Rainbow trout, Brown trout, Smelts, Salmon.
Identifiers: Burbot, Whitefish, Lake sturgeon, Chubs, Alewives, Splake, Coho salmon, Kokanee salmon.

A dramatic decline in commercially valuable fish and an instability in fisheries resources has occurred in Lake Huron since the 1940s, although the water quality has deteriorated only slightly since the early 1800s. The only significant water quality changes are confined to areas adjacent to centers of human activity, chiefly Saginaw Bay and harbors and estuaries in Georgian Bay and the North Channel. The lake has supported a commercial fishery which produced annual catches as high as 13,000 metric tons. Sea lamprey invasion had a leading role in adversely affecting the fisheries together with instances of over-fishing and water quality deterioration in Saginaw Bay with the resultant dramatic changes in fish populations. Although lake trout in the major basins were exterminated by lampreys, other large species including rainbow trout, whitefish, suckers, and burbot have

persisted. The present depressed state of the fisheries will undoubtedly continue until sea lamprey control is achieved and climax predator are reestablished. Canadian and United States governments are proceeding toward water quality criteria and fishery management practices which, hopefully, will stabilize the fisheries and prevent further deterioration. (Jones-Wisconsin)
W74-00244

ORIENTATION OF CHLOROPHYLL IN VIVO. STUDIES WITH MAGNETIC FIELD ORIENTED CHLORELLA,
New York Univ., New York. Radiation and Solid State Lab.
J. F. Becker, N. E. Geacintov, F. Van Nostrand, and R. Van Metter.
Biochemical and Biophysical Research Communications, Vol 51, No 3, p 597-602, 1973. 2 fig, 16 ref.

Descriptors: Biochemistry, *Chlorophyll, *Cytological studies, *Anisotropy, *Chlorella, Lipids, Fluorescence, Pigments, Molecular structure, Polarity.
Identifiers: Orientation, Fluorescence polarization, Chloroplasts, Magnetic field.

The study of orientation in magnetic fields yields information about the orientation of pigments in vivo. It is shown that oriented forms of chlorophyll are most probably responsible for the observed magnetic phenomena, rather than the lipid molecules. Studies of the wavelength dependence of the fluorescence polarization indicate that the bulk of the chlorophyll-a is highly oriented, whereas the short wavelength spectroscopic forms of chlorophyll are either unoriented or possess a low degree of orientation. The orientation of whole cells of Chlorella pyrenoidosa in aqueous suspensions is due to the anisotropy in the diamagnetic susceptibility of oriented chlorophyll molecules. The lipid molecules tend to align with their long axes parallel to the magnetic field and the red Q-y transition moment of chlorophyll perpendicular to the field, thus in the plane of the lamellae. The plane of the porphyrin rings tends to be parallel to the magnetic field because of the large diamagnetic susceptibility perpendicular to the ring. The porphyrin ring planes tilt away from the lamellar plane by an angle greater than 45 degrees. The short wavelength spectroscopic forms of chlorophyll are unoriented. (Jones-Wisconsin)
W74-00245

HOLOGRAPHIC MICROSCOPY OF DIATOMS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Physics.
S. P. Almeida, D. R. Del Balzo, J. Cairns, Jr., K. L. Dickson, and G. R. Lanza.
Transactions of the Kansas Academy of Science, Vol 74, No 3 and 4, p 257-260, 1971. 2 fig, 10 ref.

Descriptors: *Analytical techniques, *Microscopy, *Cytological studies, *Diatoms, Cameras.
Identifiers: *Holographic microscopy, Cyclotella, Navicula.

Holographic microscopy techniques provide another means for enhancing the study of microscopic organisms. One method for producing diatom holograms is presented. Characteristic of this group of microorganisms is encasement in a fairly rigid silicon dioxide frustule and a reasonable degree of transparency. The transparency factor led to a highly illuminated background which, in initial experiments, gave rise to poor holograms. Subsequent technique modifications corrected this situation. A schematic of the optical system used to construct and reconstruct diatom holograms is given. A 15mW Helium-Neon gas laser provides the coherent light source. After the variable beam splitter, two spatial filters SP1 and SP2 of 25 and 12 microns diameter respectively and 20X are used to render the beam relatively clean from diffraction by dust particles preceding them in the optics. The signal beam is then passed through a Bausch and Lomb micro-projector in order to magnify the specimen. The excess background light accompanying the micro-projected image which produced inadequate holograms is corrected. The reconstructed images of Navicula sp. and Cyclotella sp. holograms are photographed. (Jones-Wisconsin)
W74-00247

WATER QUALITY AND FISH LIFE BELOW SEWAGE OUTFALLS,
Maryland Univ., College Park. Natural Resources Inst.
Chu-fa Tsai.
Transactions of the American Fisheries Society, Vol 102, No 2, p 281-291, 1973. 9 fig, 1 tab, 23 ref.

Descriptors: *Outfall sewers, *Water pollution effects, *Fish, *Sewage effluents, *Outlets, Sewage treatment, Virginia, Maryland, Pennsylvania, Chlorine, Turbidity, Alkylbenzene sulfonates, Toxins, Conductivity, Ammonia.
Identifiers: Species diversity.

The relationship s between degree of water quality degradation and degree of fish community depletion below sewage effluent outfalls were studied. The objectives were to find the maximum limit of water quality degradation for each fish species, and eventually to establish water quality criteria to protect fish communities in sewage-polluted streams. Comparative studies were made of water quality and fish species diversity in stream locations immediately above and below the outfalls of 149 secondary sewage treatment plants in Virginia, Maryland, and Pennsylvania. There was a wide variation among species in sensitivity to total chlorine and turbidity parameters. While present technology does not approach that stage of complete sewage purification that will meet a stream's needs, natural purification may be considered as a supplement to present sewage treatments. To help achieve appropriate water quality objectives, several modifications of plant design and site selection for sewage disposal are proposed. Although sewage disinfection by chlorination is essential at present, in order to avoid damage to fish life, dechlorination by means of effluent holding lagoons, in addition to engineering facilities at sewage treatment plants, are recommended. (Jones-Wisconsin)
W74-00248

PHYSICAL AND CHEMICAL LIMNOLOGY OF LAKE LEAKE AND TOOMS LAKE, TASMANIA,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
R. L. Croome, and P. A. Tyler.
Arch Hydrobiol. Vol 70, No 3, p 341-354, 1972. Illus.
Identifiers: *Australia (Tasmania lakes), Lakes, *Limnology, Minerals, *Ions.

The physico-chemical limnology of 2 shallow lakes in eastern Tasmania, Australia is described. They are characterized as oligotrophic, homothermic, O2 saturated and turbid. The cationic dominance order Na > Mg > Ca > K occurs in water, ooze and inflows. Total ionic concentrations are less than 1 meq/1. Slight differences in limnology are related to lake shape and catchment ecology.--Copyright 1973, Biological Abstracts, Inc.
W74-00283

ENZYMATIC REMOVAL OF OIL SLICKS,
Oklahoma State Univ., Stillwater. Dept of Biochemistry.
For primary bibliographic entry see Field 05G.
W74-00284

POLLUTED SNOW IN SOUTHERN NORWAY AND THE EFFECT OF THE MELTWATER ON FRESHWATER AND AQUATIC ORGANISMS,
Oslo Univ. (Norway). Zoological Lab.
A. Hagen, and A. Langeland.
Environmental Pollution, Vol 5, No 1, p 45-57, July 1973. 5 fig, 4 tab, 29 ref.

Descriptors: *Melt water, *Water pollution effects, *Aquatic animals, Snowmelt, Oligotrophy, Dystrophy, Physicochemical properties, Surface waters, Iced lakes, Snow cover, Trophic level, Chemical analysis, Water analysis, Acidity, Nitrates, Sulfates, Zinc, Heavy metals, Water quality, Environmental effects, Sampling, Hydrogen ion concentration, Electrical conductance, Conductivity, Alkalinity, Nitrogen, Nitrates, Sulfates, Calcium, Magnesium, Lead, Iron, Manganese, Cadmium, Copper, Oligochaetes, Zooplankton, Biota, Benthic fauna, Water pollution, Clams, Midges.
Identifiers: *Snow contamination, *Norway, Ovre Lomtjorn, Lake Flovatn, Sialis, Chironomids, Pisidium.

In winter, surface water in some oligo-dystrophic lakes in southern Norway differed physico-chemically from what might be expected. Analyses of snow and of ice-trapped and surface water showed that polluted snow had a considerable influence on the quality of water in lakes and brooks in the winter and spring. Great quantities of, for example, SO4 (2 minus), NO3 (minus), Zn and Pb were found together with high acidity. The Zn concentration and acidity found are known to be dangerous to fish. The contaminants in general have probably had a negative effect on fish and invertebrates. It is probable that oligotrophic lakes are more susceptible to contamination than dystrophic lakes. (Holoman-Battelle)
W74-00287

ORGANOCHLORINE RESIDUES IN ESTUARINE MOLLUSKS, 1965-72 - NATIONAL PESTICIDE MONITORING PROGRAM,
Environmental Protection Agency, Gulf Breeze, Fla. Office of Pesticide Programs.
P. A. Butler.
Pesticides Monitoring Journal, Vol 6, No 4, p 238-362, March 1973. 15 fig, 20 tab, 17 ref.

Descriptors: *Mollusks, *Chlorinated hydrocarbon pesticides, *Polychlorinated biphenyls, *Pesticide residues, *Pollutant identification, Clams, Mussels, Oysters, Persistence, Watersheds (Basins), Path of pollutants, Chemical analysis, Water sampling, Invertebrates, Aquatic animals, Marine animals, Endrin, DDT, Insecticides, DDD, Monitoring, DDE, Dieldrin, Aldrin, Heptachlor, Solvent extractions, Water pollution sources, Benthic fauna, Chesapeake Bay, Delaware River, Estuaries, River basins.
Identifiers: *Biomonitoring, Sample preparation, Data interpretation, Chemical recovery, Coastal waters, Bioaccumulation, Marine environment, Fate of pollutants, Machipongo River, Rappahannock River, York River, James River, Elizabeth River, Lynnhaven Bay, Sequim Bay, Puget Sound, Samish Bay, Padilla Bay, Lummi Bay, Bear River, Naselle River, Nemah River, Macroinvertebrates, Quahog, Soft shell clam, Mirex.

The development of the national program for monitoring estuarine mollusks in 15 coastal states is described and the findings for the period 1965-72 are reported. The report is presented in two parts: Part I. General Summary and Conclusions, and Part II. Residue Data - Individual States. Analyses of the 8,095 samples for 15 persistent organochlorine compounds showed that DDT residues were ubiquitous; the maximum DDT residue detected was 5.39 ppm. Dieldrin was the second most commonly detected compound with a maximum residue of 0.23 ppm. Endrin, mirex, toxaphene, and polychlorinated biphenyls were found

only occasionally. Results indicate a clearly defined trend towards decreased levels of DDT residues, beginning in 1969-70. At no time were residues observed of such a magnitude as to imply damage to mollusks; however, residues were large enough to pose a threat to other elements of the biota through the processes of recycling and magnification. (Holoman-Battelle)
W74-00291

MERCURY: ENVIRONMENTAL CONSIDERATIONS, PART I,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
P. A. Krenkel.
CRC - Critical Reviews in Environmental Control, Vol 3, No 3, p 303-373, May 1973. 22 fig, 32 tab, 399 ref.

Descriptors: *Mercury, *Ecological distribution, *Aquatic environment, *Chemical analysis, *Water pollution sources, *Water pollution effects, *Water pollution, *Air pollution, *Soil contamination, *Documentation, *Analytical techniques, *Reviews, Municipal wastes, Ice cover, Food chains, Aquatic life, Bioassay, Methodology, Farm wastes, Domestic wastes, Solid wastes, Human diseases, Toxicity, Water analysis, Inorganic compounds, Aquatic populations, Freshwater fish, Marine fish, Rocks, Freshwater, Saline water, Aquatic soils, Industrial wastes, Path of pollutants, Environmental effects, Groundwater, Sewage effluents, Aqueous solutions, Soil analysis, Heavy metals, Ecosystems, Absorption, Ions, Cations, Poisons, Fishkill, Fish populations, Wildlife, Aquatic microorganisms.
Identifiers: *Organomercury compounds, *Snow contamination, Methylation, Biotransformation, Biological magnification, Bioaccumulation, Natural waters, Hydrogeochemistry, Mercury radioisotopes, Geochemical cycles, Chemical concentration, Detection limits, Fate of pollutants, Degradation products, Decontamination, Sample preparation, Biological half-life, Median tolerance limit, Mercury compounds, Organometallics, Alkylmercury, Minamata disease, Mobile River, Biological samples.

The mercury problem is defined in relation to its sources, environmental distribution, biological transformations, decontamination potential and physiological effects. Included are additional sections on total mercury analysis and methylmercury analysis in which are reviewed sample preparation and methods of analysis. (Holoman-Battelle)
W74-00292

A SYSTEMATIC SURVEY OF INTERTIDAL OYSTERS IN THE SAVANNAH RIVER BASIN AREA OF SOUTH CAROLINA,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
M. D. McKenzie, and A. C. Badger.
Available from NTIS, Springfield, Va., 22151 as COM-72-11059 Price $3.00 printed copy; $1.45 microfiche. Bears Bluff Laboratories Contribution No 50, February 1969. 15 p, 4 fig, 2 tab, 8 ref.

Descriptors: *Oysters, *Water pollution effects, *Estuaries, *South Carolina, Fisheries, Shellfish, Surveys, Fish populations, Spawning, Growth rates, Fish management, Ecosystems, Ecology, Aquiculture.
Identifiers: *Wright River (SC), *New River (SC).

Surveys of the position, extent, and biological characteristics of intertidal oyster beds in the Wright-New River area of South Carolina were conducted in 1965 and 1968. Results were compared with earlier surveys. The Wright-New River area is a highly productive seed oyster area. Although pollution is a major problem, oysters appear to thrive within the septic zone, and consequently, are in a condition of overcrowding. Ecologically, this situation is not advantageous for harvesting shucking stock at the present time. However, such conditions can be profitably utilized in establishing seed areas for the sole purpose of rearing oysters for transplantings. Assuming these waters could be deemed suitable for the cultivation of oysters fit for human consumption, a highly desirable variety of oysters could probably be harvested within two years following applied techniques of aquiculture. (Woodard-USGS)
W74-00300

LAND USE AS A FACTOR IN COASTAL WATER QUALITY,
California Univ., Berkeley.
For primary bibliographic entry see Field 02L.
W74-00383

PROVOKING EFFECT OF IODOBROMIC WATERS IN LEPROSY, (IN RUSSIAN),
P. M. Zorin.
Vestn Dermatol Venerol. Vol 46, No 2, p 66-68, 1972. English summary.
Identifiers: Human diseases, *Iodobromic water, *Leprosy, Water.

A woman of 58 who started balneological treatment for hypertension of II A degree and nonspecific polyarthritis developed after 5 iodobromic baths numerous spots and plaques which were diagnosed as leprosy of lepromatous type. The diagnosis was subsequently confirmed by bacterioscopic immunologic and histopathological examinations. Anamnestically similar efflorescences was observed during the past 2 yr, but their nature was not recognized in time. Before admission to balneological therapy manifestations of leprosy were absent. As a result of resorption from the bath of iodine to which patients with leprosy are particularly sensitive, the patient developed clinical exacerbat on of leprosy. Physicians of resorts and local balneoclinics should carefully study all patients arriving for treatment in order not to overlook patients with leprosy.--Copyright 1973, Biological Abstracts, Inc.
W74-00403

THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF EGG YOLKS,
Tennessee Univ., Knoxville. Dept. of Poultry.
L. H. Littlefield, J. K. Bletner, and O. E. Goff.
Poultry Science, Vol 52, No 1, p 179-181, January, 1973. 3 tab, 10 ref.

Descriptors: *Recycling, Cattle, *Farm wastes, Poultry, *Diets.
Identifiers: *Blood xanthophyll levels, *Yolk pigmentations, Blood.

Dried cow manure was added at the rate of 0, 2.5, 5, or 10 kilograms per 100 kilograms of diets containing 0 and 23 milligrams of xanthophylls per kilogram of diet to determine the effect on blood xanthophyll levels and the pigmentation of yolks produced by hens on these diets. There was a high positive linear correlation between the amount of cow manure added and the amount of xanthophyll in the blood, the amount of xanthophyll in the egg yolk, and the yolk visual score. There was a high negative linear correlation between pigmenting efficiency and the amount of cow manure added to the diet. Although cow manure was a good source of xanthophylls, it was not efficiently utilized by the hen as a source of xanthophylls. (East Central)
W74-00407

TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE,
Massachusetts Univ., Amherst. Dept. of Entomology and Plant Pathology.
J. W. Eversole, J. H. Lilly, and F. R. Shaw.
Journal of Economic Entomology, Vol 58, No 4, p 709-710, August 1965. 1 tab, 4 ref.

Descriptors: *Poultry, *Farm wastes, *Toxicity, *Insecticides, Massachusetts.
Identifiers: Flies, Larval mortality, Coumaphos oraldrench powder, Fannia canicularis, White leghorn hens.

White leghorn hens were fed mixtures of 50% coumaphos oral drench powder, and pelleted poultry feed. The insecticide levels were 0, 25, 75, and 125 mg of active ingredient per kg of feed. The mean mortalities of larvae of Fannia canicularis (L) exposed to the droppings from these birds were 7.3, 18.0, 42.5, and 91.0%, respectively. Therefore coumaphos provided an effective degree of control when fed at the 125 mg/kg level. By a comparison of the concentrations of coumaphos required to produce approximately 90% mortality of the fly larvae in this field test with the results of laboratory tests, it was estimated that approximately a 70-fold decrease in effectiveness occurred during passage of the insecticide through the birds. (East Central)
W74-00410

TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE,
Agricultural Research Service, Kerrville, Tex. Entomology Research Div.
For primary bibliographic entry see Field 05G.
W74-00423

PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOSAL LAGOONS,
Agricultural Research Service, Washington, D.C. Agricultural Engineering Research Div.
For primary bibliographic entry see Field 05D.
W74-00430

OBSERVATIONS ON THE NITROGEN FIXING POTENTIAL OF THE SURFACE WATERS OF A LARGE IMPOUNDMENT,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
R. W. Hall, Jr., and D. W. Toetz.
The Southwestern Naturalist, Vol 18, No 1, p 94-97, March 30, 1973. 3 fig. OWRR A-012-OKLA. (3), FWQA 5+1-UP-185-01.

Descriptors: *Nitrogen fixation, Reservoir, Nitrate, Ammonia, Light, *Oklahoma, Impoundments, *Cyanophyta, Seasonal.
Identifiers: *Keystone Reservoir (Okla), Inoculum.

Information of comparative limnological interest is provided on the nitrogen fixing potential of the surface waters of Keystone Reservoir, Oklahoma, and the annual cycle there of phenomena, which can control the rate of N2 fixation: temperature, light as Secchi disc transparency, the concentrations of inorganic nitrogen and species composition of the phytoplankton. The surface water of this lake had a very low N2 fixing potential, since acetylene reduction was not observed. Limnological conditions were favorable for N2 fixation by blue-green algae during the summer. However, the following blue-green algae, identified in plankton samples, are not known to fix N2: Chroococcus, Merismopedia, Oscillatoria and Lyngbya. It is speculated that N2 fixing algae did not develop a bloom because of the lack of a suitable inoculum.
W74-00436

MAN'S EFFECT ON THE GREAT LAKES,
For primary bibliographic entry see Field 04C.
W74-00444

ECOLOGY AND PRODUCTION OF THE PROFUNDAL BENTHOS IN RELATION TO PHYTOPLANKTON IN LAKE ESROM,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.

P. M. Jonasson.
OIKOS Supplementum, Vol 14, p 1-148, 1972. 94 fig, 45 tab, 357 ref.

Descriptors: *Benthic fauna, *Ecology, *Phytoplankton, *Secondary productivity, *Profundal zone, *Hypolimnion, *Environmental effects, Aquatic insects, Food habits, Life cycles, Growth rates, Mollusks, Annelids, Biorhythms, Mortality, Dominant organisms, Annual turnover, Standing crops, Aquatic plants, Crustaceans, Aquatic algae, Aquatic bacteria, Energy budget, Rotifers, Invertebrates, Tubificids, Benthos, Midges, Diptera, Eutrophication, Trophic level, Carnivores, Food chains, Water properties, Ice cover, Primary productivity.
Identifiers: Seasonal variation, Insect physiology, Nutrient supply, Seasonal succession, Energy flow, *Denmark (Lake Esrom), Detritivores, Transparency, Macrophytes, Chironomus anthracinus, Chironomids, Ilyodrilus hammoniensis, Pisidium casertanum, Chaborus flavicans, Procladius pectinatus, Macroinvertebrates, Chemical composition, Biochemical characteristics, Population density, Phantom midges, Nutrient availability.

Morphometric and environmental data of the 17.3 sq km and 22 m deep dimictic, eutrophic Lake Esrom, Denmark are given. The seasonal variation in solar radiation, temperature, oxygen, specific conductivity, pH, transparency, ionic composition, and its relationship to primary production of phytoplankton was measured over 10 years. A spring maximum of diatoms usually occurs in April after the ice cover has gone and a summer maximum of bluegreens occurs in August. The seasonal succession is correlated with duration of ice cover, solar radiation, temperature, and nutrient supply. Mean annual phytoplankton gross production was 260 g C/sq m/yr, with a range from 170 to 330 g C/sq m/yr (2,440 kcal/ sq m/yr). Net production, estimated as 75 percent of the gross production, consequently, was 195 g C/sq m/yr (1,830 kcal/sq m/yr). A comparison is made with some 20 lakes, mostly Danish, on a yearly basis. The essential relationships between environment, food, growth, life cycles, and population dynamics are described for three detritivores and two carnivores: Insects dominate secondary production, which amounts to 100 kcal/sq m/yr. Mortality in the detritivore is high (3.59 kcal/sq m/yr) but lower in the carnivores (2.6 and 1.3 kcal/sq m/yr). Other losses are due to emergence. Turn over rates are rather low. Respiratory metabolism of the benthos includes measurements of aerobic population respiration of the five species at all seasons. Community respiration of the macrofauna amounted to 432 kcal/sq m/yr, or more than four times the secondary production. The production of profundal benthos in the lake is compared with the estimated production of zooplankton and the trophic relations between phytoplankton, zooplankton and benthos are discussed. This provides a broad picture of the energy flow in the lake. (Holoman-Battelle)
W74-00466

METABOLIC EFFECTS OF TECHNICAL PENTACHLOROPHENOL (PCP) ON THE EEL ANGUILLA ANGUILLA L.,
National Board of Fisheries, Goteborg (Sweden).
B. Holmberg, S. Jensen, A. Larsson, K. Lewander, and M. Olsson.
Comp Biochem Physiol B Comp Biochem. Vol 43, No 1B, p 171-183. 1972. Illus.
Identifiers: *Anguilla-anguilla, *Eels, *Metabolism, *Pentachlorophenol, Pesticides, Phenols.

Eels (A. anguilla L.) were exposed to sea water and fresh water containing 0.1 ppm pentachlorophenol (PCP). The accumulation of the pesticide as well as the effects on different metabolites in blood, muscle and liver were studied. PCP exposure caused changes, indicating a hypermetabolic state with accelerated utilization of tissue energy reserves. An altered cholesterol metabolism, a decreased activity of liver glutamate pyruvate transaminase (GPT) and an enlargement of the liver suggested a disturbed liver function. The effects of PCP seemed to persist in spite of a recovery period in clean water for about 2 mo.--Copyright 1973, Biological Abstracts, Inc.
W74-00482

THE EFFECT OF KCL IN DRINKING WATER ON MILK SECRETION AND COMPOSITION, (IN RUMANIAN),
Institutul de Cercetari Zootechnice, Bucharest (Rumania). Lab. for the Fiziology of Animals.
D. Popovici, and M. Raitaru.
Stud Cercet Biol Ser Zool. Vol 24, No 3, p 209-214. 1972. (English summary).
Identifiers: Chlorides, Cows, *Milk, *Potassium chloride, *Potable water.

The effect of KCl added to drinking water (1g o/oo) on milk yield and composition was studied on a group of 6 cows. In these conditions water consumption and the percentage of milk fats increase. Milk production and protein concentration are relatively constant. An increase of water K concentration is observed while Na concentration remains relatively constant. The effects of KCl added to drinking water are maintained also in the following period, when animals drink unaltered water.--Copyright 1973, Biological Abstracts, Inc.
W74-00483

ECOLOGICAL STUDIES ON THE PENAEUS ORIENTALIS KISHINOUE CULTURED IN A POND FILLED WITH SEA WATER: I. GROWTH RATE AS RELATED TO THE SUBSTRATE MATERIALS, SURVIVAL RATE, PREDATOR OF P. ORIENTALIS, AND WATER CONDITIONS OF CULTURING POND,
Seoul National Univ. (Republic of Korea). Coll. of Education.
K. C. Choi, and Y. K. Song.
Bull Korean Fish Soc. Vol 4, No 2, p 47-54. 1971. Illus.
Identifiers: Acanthogobius-Flavimanus, Culturing, Ecological studies, *Growth rates, *Penaeus-Orientalis, Ponds, Predator, Sea water, Survival.

The differences in growth rate of P. orientalis cultured on muddy bottom region and sandy bottom region in a pond filled with sea water were studied. For the investigation of the growth rate, the body length and the body weight were determined. Five individuals from each experimental region were sampled at random. The samples were collected at 10-day intervals. The survival rate, the predator of P. orientalis, and the water conditions during the experimental period were also determined. The growth rate of P. orientalis which was cultured in the muddy bottom region was greater than that in the sandy bottom region, regardless of whether they were cultured with or without food. When the predator is not present, 84% of P. orientalis may survive. Acanthogobius flavimanus is one of the predator of P. orientalis. The variation of water conditions of the pond, in which water had been exchanged 12 times per month, did not affect to the survival rate of P. orientalis.--Copyright 1973, Biological Abstracts, Inc.
W74-00486

ROLE OF ULTRANANNOPLANKTON ALGAE IN PRIMARY PRODUCTION IN LAKE BAIKAL DURING THE SUMMER, (IN RUSSIAN),
For primary bibliographic entry see Field 02H.
W74-00488

EFFECTS OF WATER POLLUTION ON THE ICHTHYOFAUNA: IV. TOXICITY OF ACIDS, ALKALIES AND SOME INORGANIC GASES,
P. Epler.
Postepy Nauk Roln. Vol 18, No 6, p 85-102. 1971. Illus.
Identifiers: *Acids, *Alkalies, Fauna, Fish, *Ichthyo-fauna, Inorganic gases, Pollution, *Toxicity, Water pollution.

Acids produce free CO2, which is lethal to fish, in water with a high bicarbonate content. Resistance to pH of the order of 3.6 rapidly grows with age in trout. Strong alkalies are toxic at pH above 10.0. Acids are generally toxic at pH below 4.0. A concentration of 1.5 mg CO/1 appears to be lethal. Free Cl is highly dangerous and forms chemical compounds of no lesser toxicity, such as chloramine and cyanogen (CN) chloride, toxic in amounts exceeding 0.1 mg ClCN/1.--Copyright 1973, Biological Abstracts, Inc.
W74-00489

TOXICITY OF POLYCHLORINATED BIPHENYLS (PCB) TO GOLDFISH,
Jyvaskyla Univ. (Finland). Dept. of Organic Chemistry.
M. L. Hattuia, and O. Karlog.
Acta Pharmacol Toxicol. Vol 31, No 3, p 238-240. 1972. Illus.
Identifiers: *Goldfish, Nervous systems (Fish), *Toxicity, *Polychlorinated biphenyls, Fish pathology.

The harmful effects of PCB were easily observed. The fish lost their appetite and their bright orange color turned to pale yellow, the changes being most obvious with the highest concentrations of PCB. The effect on the nervous system was observed as uncoordinated movements after which the fish turned to side positions. To ensure that the effects were caused by PCB and not by starvation, another control group of 16 fishes were starved in clean water for 10 days. With exception of a 25% loss of weight and 2 deaths no abnormalities were noted.--Copyright 1973, Biological Abstracts, Inc.
W74-00492

INDUCTION OF MICROSOMAL LIVER ENZYMES AFTER POLYCHLORINATED BIPHENYLS (PCB) AND FOLLOWING STRESS, (IN GERMAN),
Hamburg Univ. (West Germany). Pharmakologisches Institut.
H. F. Benthe, A. Schmoldt, and H. Schmidt.
Arch Toxikol. Vol 29, No 2, p 97-106. 1972. Illus. (English summary).
Identifiers: *Enzymes, Human adipose tissue, Rat liver, Tissue, *Polychlorinated biphenyls.

One i.p. injection of PCB induces a high stimulation of rat liver microsomal drug oxidizing enzymes; equimolar doses of tetrachlorobiphenyls are distinctly more effective than dichlorobiphenyls. The effect can still be demonstrated distinctly 4 wk after application. During this time the liver concentration of tetrachlorobiphenyls decreased to 7 microgram/g tissue whereas the concentration of adipose tissue rose to 252 microgram/g. By stress tetrachlorobiphenyls are mobilized along with fat, causing an increase of liver concentration to 32 microgram/g. Simultaneously, a new stimulation of microsomal activity can be seen, nearly equal to the maximum stimulation 4 days after i.p. application of 500 mg.kg b.w. Parallel to microsomal stimulation there is an increase of relative liver weight. Stress induced activation of microsomal activity caused by PCB redistribution is important for the evaluation of PCB in environmental toxicology, in view of rising PCB concentrations in human adipose tissue.--Copyright 1973, Biological Abstracts, Inc.
W74-00493

ZOOBENTHOS RESOURCES AND PRODUCTIVITY IN THE GULF OF TAGANROG, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
M. Ya. Nekrasova.

Gidrobiol Zh. Vol 8, No 4, p 41-47. 1972. (English summary).
Identifiers: *Benthos, *Productivity, Salinity, *USSR (Taganrog Bay), Zoo benthos.

An evaluation was made of the fodder capacity of the Taganrog Bay, USSR, bottom fauna during the period of regulated flow of the Don. Resources P/B coefficients (ratio of productivity to the spring biomass) and productivity indices were calculated for this purpose. The highest P/B values was on the high and middle water level periods and was lowest on the lower water level periods. The low P/B values showed a decrease in zoobenthos reproductivity with decrease of the Don flow and increase of salinity in the bay.--Copyright 1973, Biological Abstracts, Inc.
W74-00495

ROLE OF BACTERIA IN THE FEEDING OF ZOOPLANKTON OF THE DNIEPER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk USSR, Kiev. Instytut Hidrobiologii.
D. Z. Gak.
Dokl Akad Nauk SSSR Ser Biol. Vol 203, No 3, p 696-697. 1972. Illus.
Identifiers: Algae, *Bacteria, Feeding, Plankton, Reservoirs, *USSR (Dnieper reservoir), Zoo plankton, *Cyanophyta, *Eutrophication.

Proof is presented on the major role of bacteria in the feeding of zooplankton of eutrophic reservoirs (USSR) blooming with blue-green algae.--Copyright 1973, Biological Abstracts, Inc.
W74-00496

HYDROGRAPHY, CHEMISTRY AND LOAD OF NUTRIENTS OF A MOUNTAIN STREAM POLLUTED BY ORGANIC WASTE WATER, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Institut.
U. Franke, and J. Schwoerbel.
Arch Hydrobiol Supplement B. Vol. 42, No 1, p 95-124. 1972. Illus. (English summary).
Identifiers: Bioactivity, Chemistry, *German (Mettma stream), Hydrography, Mountain streams, Nutrient load, Organic wastes, Polluted streams, Waste water, *Brewery effluents.

The Mettma stream, a small freshwater river in Germany polluted by brewery effluent, was investigated. Running water, in which organic nutrients are introduced, permanently changes its metabolism-type from the point of entry of the sewage. At the same time chemical conditions change. The stream purified itself. After a certain distance downstream there is a balance in metabolism just as there was above it, but the bioactivity is increased.--Copyright 1973, Biological Abstracts, Inc.
W74-00499

HYDROBIOLOGICAL INVESTIGATION OF LAKE LERE AND NEIGHBORING PONDS: I. THE PHYSICAL ENVIRONMENT, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamy (Chad).
For primary bibliographic entry see Field 02H.
W74-00501

HYDROBIOLOGICAL INVESTIGATION OF LAKE LERE (CHAD) AND NEARBY PONDS: IV. THE BENTHIC FAUNA,
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamay (Chad).
For primary bibliographic entry see Field 02H.
W74-00502

TWO STUDIES OF PESTICIDE RESIDUES,
Texas A and M Univ., College Station. Environmental Quality Program.
L. J. Dziuk, and R. E. Kramer.
Environmental Quality Note 13, July 1973. 47 p.

Descriptors: *Water pollution effects, *Pesticide residue, *Insecticides, *Ecosystems, Environmental effects, Ecology, Fish, Fish genetics, Fish reproduction, Surface waters, Cotton, Insect control, *Texas, Environmental effects, Aquatic life, Sampling, Resistance, Fish toxins, Data collections.
Identifiers: *Brazos County (Tex), *Burleson County (Tex).

The report includes the following: A Study of Pesticide Residue Levels and Insecticide Resistance in Selected Aquatic Organisms Occurring Around the Bryan - College Station Agricultural Production Areas, by L.J. Dziuk; and A Survey of DDT Residues in Fish From the Brazos and Navasota Rivers and Somerville Reservoir, by R. E. Kramer. The phenomena of pesticide transferal and biological magnification have aroused widespread interest in the sublethal effects of pesticides on fish. Reduced reproductive capability has been demonstrated as one sublethal effect on fish. Pesticides can affect the physiological processes of a fish to a point where normally nonlethal environmental stresses become lethal. Sublethal effects of several pesticides within the body of a fish may combine to cause death. Continued contamination of freshwater ecosystems with DDT has resulted in varying degrees of insecticide resistance in aquatic organisms. In areas where DDT has been applied for a number of years for control of insect pests, the nontarget organisms there have been conditioned, due to genetic adaptation, to live in the contaminated environment. (See W74-00530 and W74-00531) (Woodard-USGS)
W74-00529

A STUDY OF PESTICIDE RESIDUE LEVELS AND INSECTICIDE RESISTANCE IN SELECTED AQUATIC ORGANISMS OCCURRING AROUND THE BRYAN-COLLEGE STATION AGRICULTURAL PRODUCTION AREAS,
Texas A and M Univ., College Station. Environmental Quality Program.
L. J. Dziuk.
In: Two Studies of Pesticide Residues Environmental Quality Note 13, p 10-24, July 1973. 2 fig.

Descriptors: *Pesticide residues, *Insecticides, *Pollutants, *Water pollution effects, *Aquatic life, Analytical techniques, Sampling, Fish, Surface waters, Ecosystems, DDT, Insect control, Environmental effects, Resistance, Cotton, *Texas.
Identifiers: *Brazos County (Tex), *Burleson County (Tex).

One objective was to determine at what levels DDT and its metabolites were concentrated by the aquatic organisms at various places in an intensively managed cotton-growing area of Texas. A survey was made to find a series of sites that would reflect at least some degree of pesticide usage, ranging from high to virtually no contamination. A map of Brazos and Burleson Counties shows the locations of the sampling sites. Because DDT was not applied to the cotton fields in the immediate area during the sampling period, it appears that biological variability in the mosquitofish sampled may have played a large part in the extreme variation of the levels of p,p' - DDT from week to week. Insecticide resistance confers a survival advantage in an organism exposed to levels of insecticide that would prove fatal to susceptible populations. Brazos-R mosquitofish illustrate this point. DDT and toxaphene were both used in quantity in the immediate area of the fish population. These fish were able to withstand approximately 10 times more toxaphene than a susceptible population, and approximately 12 times as much DDT as the susceptible population. If resistance had not been developed to these two compounds, the mosquitofish population might not have been able to survive such adverse conditions. (See also W74-00529) (Woodard-USGS)
W74-00530

A SURVEY OF DDT RESIDUES IN FISH FROM THE BRAZOS AND NAVASOTA RIVERS AND SOMERVILLE RESERVOIR,
Texas A and M Univ., College Station. Environmental Quality Programs.
R. E. Kramer.
In: Two Studies of Pesticide Residues Environmental Quality Note 13, p 25-47, July 1973. 14 tab, 31 ref.

Descriptors: *Water pollution effects, *Aquatic life, *Pesticide residues, *Fish, Surface waters, Lentic environment, Lotic environment, Reservoirs, Rivers, *Texas, Environmental effects, Insecticides, DDT, Ecosystems.
Identifiers: *Burleson County (Tex).

Intensive agricultural activity in the Brazos Valley, Texas, has raised questions concerning insecticide residue presence and accumulation in fish from local agroecosystems. One lentic and two lotic systems were sampled. The lentic system is Somerville Reservoir in southern Burleson County. The two lotic systems are the Brazos and Navasota Rivers. Muscle tissue of fish from all three aquatic systems contained some measurable amount of either DDE, DDD, or DDT. DDT residues were detected in samples from both lotic systems but not in those from the lentic system. DDD and DDE were detected in samples from all three aquatic systems. Fish from the Brazos River contained the highest residues of all of the fish collected. All samples analyzed contained DDE in measurable quantities. Channel catfish contained the highest average level of DDE in the muscle tissue (0.309 ppm) of any species of fish collected from the river. Freshwater drum had only slightly lower average DDE levels (0.296 ppm) than channel catfish. The lowest average DDE levels were in carpsuckers at 0.163 ppm. DDD and DDT were confirmed in 52% of the samples analyzed. DDD and DDT could be quantitated only in tissue samples of channel catfish and were slightly more than 0.1 ppm. Carp was the only species other than channel catfish that consistently contained trace amounts of DDD and DDT in muscle tissue. (See also W74-00529) (Woodard-USGS)
W74-00531

5D. Waste Treatment Processes

DEVELOPMENT AND PILOT-TESTING OF AN AUTOMATIC INFORMATION DISSEMINATION SYSTEM.
Environmental Quality Systems, Inc., Rockville, Md.

Available from the National Technical Information Service as PB-224 501, $4.25 in paper copy, $1.45 in microfiche. Completion Report proposed for Water Resources Scientific Information Center, September 1973. 72 p, 2 fig, 2 tab, 31 ref, 6 append. OWRR W-175 (No 9075) (1).

Descriptors: *Mathematical models, Computer programs, *Information retrieval, Engineering, Design, *Waste water treatment, Computer models, Sewage treatment, Model studies, Abstracts.
Identifiers: *Information Centers and Services, *Content analysis, *Dissemination techniques, *Consulting engineers, *Facility design, Information systems, Information Storage and Retrieval.

An Automatic Information Dissemination System (AIDS) flexible enough to accommodate a wide variety of user needs for technical information was developed and successfully pilot-tested. Methods for accelerating the application of research results were studied using mathematical models and computer programs useful in the design of wastewater treatment facilities as a sample technical area. Engineering firms with design experience were directly consulted to verify their needs for models and programs, and to solicit their views on effective dissemination techniques. Based on the engineers' comments, a system was developed to satisfy individual information needs by automatically disseminating the appropriate level of detail on each model or program. The levels of detail are cumulative so that in any one consulting organization some individuals may receive general notification (Step I), while others who have direct interests and responsibilities for models and programs can receive progressively more detailed information. Some individuals would received a detailed assessment of the model's utility and a description of the reference documents available (Step II). A few individuals would receive the actual documents (Step III), and one person would receive all of the foregoing information, plus the source deck, a user's manual, and other pertinent materials (Step IV). If required, extension services would be available (Step V). Results are reviewed. Recommendations included a field evaluation and subsequent large-scale implementation. (Gaughan-EQSI)
W74-00003

SEWAGE TREATMENT METHOD AND APPARATUS,
Y.S. Lin, and C. F. Chang.
U. S. Patent No. 3,753,897, 5 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 913, No 3, p 948, August 21, 1973.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Aeration, Aerobic treatment, Activated sludge, Bacteria, *Reaeration, Water pollution control, Pollution abatement, Water quality control, Equipment, Treatment, *Sludge treatment.

Partitions within the main container of this sewage treatment apparatus define aeration, stabilization and sedimentation chambers. A digestion cavity is placed beneath the stabilization chamber. Raw sewage is first directed into the aeration chamber. Settled sludge is drawn from the stabilization chamber and introduced into the aeration chamber. The sludge mixes with the sewage to cause the bacteriological conversion of solids into a liquid suspension of activated sludge flocs. The suspension is then directed into the sedimentation chamber to separate out the sludge from the liquid. The separated sludge is directed back into the stabilization chamber where a portion of it is returned to the aeration chamber and a portion settles into the digestion cavity. The aerated sewage is then led from the aeration chamber into the stabilization chamber to reaerate the sludge therein as well as the sludge which settled in the digestive cavity. The liquid remaining in the sedimentation chamber is directed out of the apparatus as ready for disposal or reuse. (Sinha-OEIS)
W74-00082

SELECTIVE DESTRUCTION OF BACTERIA,
For primary bibliographic entry see Field 05F.
W74-00083

FILTER MEDIA FOR LIQUID WASTES TREATMENT AND METHOD OF FORMING THE SAME,
Del-Pak Media Corp., Oakland, Calif., (Assignee)
E. R. Carlson.
U. S. Patent No. 3,750,887, 5 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 913, No 1, p 187, August 7, 1973.

Descriptors: *Patents, *Liquid wastes, *Waste water treatment, *Filters, *Filtration, Equipment, Separation techniques, Pollution abatement, Water pollution control, Water quality control, Biological treatment.

Pallet-like units are used as biological growth supporting surfaces. They are placed so as to form a self supporting stackable structure. The positioning of the supporting parts enables stacking of the units in vertically superimposed, horizontally extending layers with some of the horizontal units staggered or displaced so that units overlap each other and provide stability in the filter array. The pallet-like units may be formed of redwood, pressure treated wood, or a plastic material. (Sinha-OEIS)
W74-00091

ENGINEERING ALTERNATIVES IN NATURAL RESOURCES DEVELOPMENT IN URBAN REGIONS,
Philadelphia Water Dept., Pa.
S. S. Baxter.
In: National Conference on Urban Water Research, March 17-19, 1970, Keynote and Plenary Session Papers. p 19-23. (1970).

Descriptors: Sewerage, Sewage systems, Sewage disposal, Waste water treatment, Water quality, *Regional development, *Alternative planning, *Water reuse, *Recycling, *Municipal water, Natural resources, Cities, Urbanization.
Identifiers: Engineering alternatives.

Historically the waters of streams and rivers have been used to transport and dispose of waste material. In recent years there has been growing pressure to recycle this water and reuse it. In determining whether to treat the water so that it is fit for reuse in metropolitan areas several alternatives have traditionally been considered. Among these are going to an upland source of water in a more sparsely developed area and providing the water for the city by damming up smaller streams; making the most modern treatment plants so the river can continue to be used as the original source; and cleaning the rivers to such a degree they approximate the condition of the upland source. Recent developments have made other alternatives worth considering. One of these is regional treatment of water. Another is parallel supply systems, one containing water fit for human consumption, and the other containing water treated only to eliminate disease, which water is fit for industrial use, street washing, fire fighting, toilet flushing and other uses. These alternatives are anlyzed. (See also W71-09468 and W71-09469) (Wadley-Florida)
W74-00122

PROCEEDINGS: LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW.
For primary bibliographic entry see Field 05G.
W74-00125

NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM,
Agricultural Research Service, Beltsville, Md.
For primary bibliographic entry see Field 05G.
W74-00126

REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM,
Nebraska Univ., Lincoln. Agricultural Experiment Station.
For primary bibliographic entry see Field 05G.
W74-00127

APPLICATION, UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05G.
W74-00129

DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS,
Agricultural Research Service, Lincoln, Neb.
For primary bibliographic entry see Field 05G.
W74-00130

APPLICATION, UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05G.
W74-00136

WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK,
Agricultural Research Service, Clay Center, Nebr. Meat Animal Research Center.
For primary bibliographic entry see Field 05G.
W74-00139

OTHER RESEARCH NEEDS,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05G.
W74-00140

PRESSURE SEWER DEMONSTRATION AT THE BOROUGH OF PHOENIXVILLE, PENNSYLVANIA,
General Electric Co., Philadelphia, Re-Entry and Environmental System Div.
G. Mekosh, and D. Ramos.
Copy available from GPO Sup Doc as EP1.23/2:73-270, $1.00; michrofiche from NTIS as PB-224 456, $1.45. Environmental Protection Agency, Technology Series, EPA-R2-73-270, July 1973. 70 p, 13 fig, 10 tab. EPA Project 11050 FOU.

Descriptors: Water pollution control, *Sewers, *Sewage disposal, Plastic pipes, *Pressure conduits, Data collections, Costs, *Pennsylvania.
Identifiers: *Pump-grinders, *Pressure sewers, System monitoring, Cost breakdown, Wastewater characterization, *Phoenixville (Penn).

A site was selected at the Borough of Phoenixville, Pennsylvania, which provided a maximum variable exercise of a pressure sewer system. The site consisted of five residences spread over more than one-half mile in hilly and predominantly shale-based terrain. The residences varied from a small house to a multiple-unit apartment house. The apartment house is more than half a mile in distance and 60 feet in elevation below the existing conventional gravity sewer inlet point. The project proved over a six-month period that a multiple residence pressure sewer system can adequately store peak loads of wastewater and grind and pump wastewater through small-diameter plastic pipe to the existing conventional gravity sewer. During the project, data was collected which provided information concerning the installation, operation and maintenance of the system, its technical performance, the variations in that performance during the six-month period and the characteristics of the wastewater as delivered to the existing gravity sewer. (Kreissl-EPA)
W74-00153

PHYSICAL-CHEMICAL TREATMENT OF A MUNICIPAL WASTEWATER USING POWDERED CARBON,
Envirotech Corp., Salt Lake City, Utah. Eimco Process Machinery Div.
D. E. Burns, and G. L. Shell.
Copy available from GPO Sup Doc as EP1.23/2:73-264, $2.25; microfiche from NTIS as PB-244 494, $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-264, August 1973. 230 p, 59 fig, 35 tab, 37 ref. EPA Project 17020 EFB. Contract 14-12-585.

Descriptors: *Waste water treatment, *Adsorption, *Coagulation, Activated carbon, Filtration, Solids contact process, Sludge treatment, Lime, Costs, Dewatering, Pilot plants, *Utah.
Identifiers: *Physical-Chemical treatment, *Powdered carbon, *Carbon regeneration, Alum, Ferric chloride, Sludge thickening, Sludge dewatering, *Salt Lake City (Utah), Combined treatment.

A municipal waste water was treated in a nominal 100 gpm pilot plant by chemical coagulation-precipitation, powdered activated carbon adsorption and granular media filtration. Spent carbon was gravity thickened, vacuum filter dewatered and thermally regenerated in a fluidized bed furnace. Solids-contact units were used for chemical treatment and carbon contacting. Ferric chloride, alum or lime were all found to effectively produce coagulation and phsophorus insolubilization. Based on total treatment costs, including sludge disposal, alum treatment was estimated to be the economic choice for Salt Lake City municipal waste water. Organic removal in the powdered carbon contactors was substantially enhanced by anaerobic biological activity. The use of solids-contact treatment units for carbon contacting resulted in effecting gravity clarification without the use of chemicals. The powdered carbon physical-chemical treatment system produced a treated effluent similar to that expected for biological treatment followed by tertiary treatment for phosphorus removal. Carbon losses of 17 to 60 percent were experienced across the fluidized bed furnace regeneration system. The cause of high carbon losses was identified as ignition of carbon instead of gas which was injected into the fluidized bed to scavenge excess oxygen. (Kreissl-EPA)
W74-00154

PILOT PLANT DEMONSTRATION OF LIME--BIOLOGICAL TREATMENT PHOSPHORUS REMOVAL METHOD,
Kansas State Univ., Manhattan. Dept. of Civil Engineering.
L. Schmid.
Copy available from GPO Sup Doc as EP1.23/2:73-159, $0.85; microfiche from NTIS as PB-224 476, $1.45. Environmental Protection Agency, Technology Series, Report EPA-R2-73-159, June 1973. 48 p, 16 fig, 7 tab, 12 ref. EPA Project 17050 DCC.

Descriptors: *Nutrient removal, *Chemical coagulation, *Biological treatment, Sludge, Municipal waters, *Waste water treatment, Biological oxygen demand, Pilot plants, Instrumentation, Turbidity, *Phosphorus, Lime.
Identifiers: Diurnal flow, Program controller, Respiration rate, Phosphate analyses, *Lime treatment.

A 15,000 gpd pilot plant was constructed to demonstrate the capabilities of a lime treatment process for phosphorus removal. The lime treatment of raw waste water removes the bulk of the phosphorus, and a subsequent biological process removes an additional increment of phosphorus via cell synthesis. The pilot plant used for the study was a package-type, prefabricated unit. Additional small tanks were provided for sludge storage and measurement. A variable speed motor was mated to a program controller to duplicate a diurnal flow pattern through the pilot plant. Lime was introduced into the raw waste water in response to an utomated pH control system. Instrumented systems were also developed for turbidity and ortho-phosphate concentrations in the plant effluent. The raw waste water entering the pilot plant was obtained from the wet well of the Manhattan, Kansas Municipal Plant. Lime treatment of raw waste water to a pH of 9.5 to 10.0 resulted in phosphorus removal of about 80 percent in the primary clarifier. The removal of BOD at this pH level was about 60 percent as compared to 35 percent normally expected in primary settling. The biological activated sludge process following the lime treatment neutralized the primary effluent due to the microbial carbon dioxide production. Aerator pH's were in the neighborhood of 8.0. Lime treatment prior to biological treatment resulted in a change of the settleability of the mixed liquor. Rather high sludge volume indexes were routinely encountered. The process is capable of 90 percent phosphorus removal; however, consistent removal is only assured at the 80 percent level. (EPA)
W74-00155

MUNICIPAL DESALTING STUDIES FOR SELECTED KANSAS COMMUNITIES,
Wilson and Co., Salina, Kans.
For primary bibliographic entry see Field 05F.
W74-00156

A PROMISING APPROACH TO SOLVING A STREAM POLLUTION PROBLEM,
Calspan Corp., Buffalo, N.Y.
K. Wang, J. Schwartz, and B. T. Kown.
Technical paper, presented at the 18th Annual Meeting of the Institute of Environmental Sciences, New York, N.Y., May 4, 1972; 15 p, 1 fig, 7 tab, 8 ref.

Descriptors: *Waste water treatment, Water quality, *Water treatment, Filters, *Recycling, Water pollution sources, Pilot plants, Sludge, *Water reuse.
Identifiers: Alum sludge, Jar tests, *Filter backwash water.

The backwash wastewater from a water purification plant has been classified as a potential pollutant and treatment is required before disposal. A promising approach to solving a stream pollution problem is to eliminate such waste discharge completely. The feasibility of direct recycling of filter backwash water was evaluated. The specific objectives were to determine the effects of the backwash recycle on the filter operation and the plant effluent quality. Preliminary laboratory studies were conducted using a series of standard jar tests. A continuous pilot plant of 1440 gal./day capacity was also constructed for a final phase feasibility study. Advantages of direct recycling of filter backwash water are a elimination of a stream pollution problem, the recovery and reuse of filter backwash water for water supply, and an increase in filter operation time. A water filtration plant, with recycling and reuse of its own filter backwash water, would materially reduce the volume of liquid waste. (Calspan)
W74-00164

GLUE TREATMENT-PICK A WAY,
Calspan Corp., Buffalo, N.Y.
L. K. Wang, P. Leonard, J. G. Michalovic, and D. W. Goupil.
Water and Wastes Engineering, Vol 10, No 9, p E20-E25, September 1973, 4 fig, 3 tab. 86-294.

Descriptors: *Waste water treatment, *Activated carbon, Chemical precipitation, *Chromium, *Recycling, Industrial wastes, Water pollution sources, Sludge, *New York, Industrial water, Water reuse.
Identifiers: *Glue factory wastes.

A typical animal-glue manufacturing plant in New York was selected for investigation. The animal-glue manufacturing procedures, the sources and characteristics of glue factory wastes, and the environmental pollution problems caused by the solid and liquid wastes are reviewed and studied. Four potential waste-treatment schemes which would solve the pollution problem or convert both solid and liqud wastes to useful by-products are also studied or assessed. The treated water can be recycled as industrial water. Chromium in the acid stream of glue factory waste can be recovered by chemical precipitation and incineration. Spent activated carbon can be regenerated for reuse. Organic waste sludge can be converted to powdered activated carbon by a Calspan-developed pyrolysis process. The sludge-generated carbon, in turn, can be used for wastewater treatment. (Calspan)
W74-00165

ESTIMATING REGIONAL WASTEWATER TREATMENT COSTS,
Wisconsin Dept. of Natural Resources, Madison. Water Resources Planning Section.
R. J. Timm, and J. M. Cain.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 21 p, 2 fig, 2 tab, 9 ref.

Descriptors: *Waste water treatment, *Operating costs, *Estimating, *Pumping plants, Optimization, Computer models, Wisconsin, Systems analysis, Operation and maintenance, Construction costs, Regions, Statistical methods.
Identifiers: Regression equations, Standard deviations.

Regionalized sewage systems can reduce per capita sewage treatment costs providing proper regions are established. A computerized model has been developed to estimate costs of treatment systems for any specified region. Based on recent project costs, regression equations are developed to estimate interceptor and pumping station costs. Results of recently published studies are used to estimate initial construction costs and annual operating and maintenance costs of treatment plants. Standard deviations of all costs are calculated so that both an average cost and a cost confidence can be estimated. The model can be used to optimize costs of any given level of treatment. An example in central Wisconsin is presented to illustrate this use of the model. (Bell-Cornell)
W74-00169

DESIGN OF OPTIMAL SEWERAGE SYSTEMS,
Technion - Israel Inst. of Tech., Haifa.
Y. Argaman, U. Shamir, and E. Spivak.
Journal of the Environmental Engineering Division, American Society fo Civil Engineers, V0l 99, No EE5, Proceedings paper No 10050, p 703-716, October 1973. 3 fig, 7 ref.

Descriptors: *Sewers, *Pipes, *Design, *Costs, *Dynamic programming, Computers, Optimization, Environmental engineering, Sanitary engineering, Waste water disposal, Constraints, Hydraulics, Methodology.
Identifiers: *Cost minimization, Network design, Sewerage networks, Pipe diameter, Pipes layout, Pipe slope.

The costs of sewerage systems constitute a major fraction of the overall cost of wastewater disposal. Thus, substantial sums of money can be saved by improving network design. Current design procedures involve selection of pipe sizes and slopes to ensure adequate capacity for peak flows and adequate scouring velocities at minimum or average flows, analysis of several alternative systems, and selection of the least-cost system. A procedure already developed for optimizing a sewer network is impractical at present due to limitations in computer space and computation time. An alternative, more restrictive, procedure is proposed by which a suboptimal design can be obtained with a reasonable computation effort. This procedure utilizes dynamic programming; its usefulness has been demonstrated for small sewerage networks. Large sewerage systems may be decomposed to smaller subsystems, which are optimized internally, and later recombined to a single optimal network. This work constitutes a step toward the development of a calculation technique by which the selection of the least-cost combination of pipes layout, diameters, and slopes can be made in a single computation procedure. (Bell-Cornell)
W74-00183

WATER QUALITY AND FISH LIFE BELOW SEWAGE OUTFALLS,
Maryland Univ., College Park. Natural Resources Inst.
For primary bibliographic entry see Field 05C.
W74-00248

PILOT-DEMONSTRATION PROJECT FOR INDUSTRIAL REUSE OF RENOVATED MUNICIPAL WASTEWATER,
Central Contra Costa Sanitary District, Walnut Creek, Calif.
G. A. Horstkotte, Jr.
Copy available from GPO Sup Doc as EP1.23:670-73-064, $1.55; microfiche from NTIS as PB-224 507, $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-064, August 1973. 133 p, 26 fig, 21 tab, 12 ref. EPA Project 17080 FSF.

Descriptors: *Water reuse, *Reclaimed water, Sewage treatment, Tertiary treatment, *Waste water treatment, *Pilot plants, Municipal water, *Cooling towers, *Heat exchangers, Phosphorus, Corrosion, Fouling, Scaling.
Identifiers: Canal water.

Three pilot plant treatment sequences were operated during this study to produce various grades of effluent for subsequent testing as industrial water sources. The testing was conducted in pilot-sized test loops consisting of small cooling towers and heat exchangers. At the same time the renovated waters were tested, Contra Costa Canal water, which is presently used by industry in the study area, was also investigated in a test-loop identical to those used for the renovated water. The study results illustrated that the wastewater investigated can be treated satisfactorily for reuse in industrial applications. Corrosion rates and fouling factors observed with renovated water were equal to or less than found with the canal water. Precipitation of phosphorous was the major source of scale formation while using renovated water for cooling purposes, thus indicating the need for phosphorous removal. (EPA)
W74-00305

RESEARCH ON REVERSE OSMOSIS MEMBRANES FOR PURIFICATION OF WASH WATER AT STERILIZATION (165 DEG F),
General Electric Co., Lynn, Mass.
J. M. Amore, J. F. Enos, and A. B. LaConti.
Available from the National Technical Information Service as PB-222 950, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 866, February 1972. 71 p, 14 fig, 14 tab, 5 ref. 14-30-2752.

Descriptors: *Membranes, *Reverse osmosis, *Membrane processes, Permselective membranes, Separation techniques, Semipermeable membranes, *Waste water treatment.
Identifiers: *Sulfonated polyphenylene oxide membranes, Meniscus coating process, Ion exchange membranes, Composite films, Wash water, Synthetic wash water, Breadboard modules.

Reliable techniques were developed for meniscus coating sulfonated polyphenylene oxide membranes (PPO) of IEC ± 1.3 on Celgard 2400 to yield composite films approximately 2 ft long x 1 ft wide. A CHCl3/butanol casting solvent was identified that yielded reproducible composite films with a sulfonated PPO membrane thickness of 0.05 to 0.1 mil. Reverse osmosis (RO) performance of the composite films was essentially equivalent to results achieved with knife-cast films of the same IEC. Aerospace-configured gasketed plate and frame RO hardware was designed and fabricated. The breadboard units employed thin channel labyrinth flow and series connected feed channels. A unique 'composite gasket' screen configuration was developed that minimized probability of internal leakage during 165 deg F steady state operation. Parametric life testing at 165 deg F was conducted with 2.5 gpd breadboard units with synthetic and real wash water. Results indicated that a one-pass system with inlet flow of 0.05 gpm may not be feasible because of concentration, polarization and projected fouling problems. The feasibility of developing a viable multipass plate and frame module was investigated. A feed flow rate of 0.15 gpm and average RO pressure of 600 psi were chosen as trade-off design points for life testing. Life tests revealed that at least 3 micron filtration of real wash water is required to minimize fouling (10 to 20%). It was demonstrated that original performance of a fouled membrane in a breadboard module can be essentially restored by treatment under operation with a 165 deg F caustic soap solution. Breadboard modules with 7.5 gpd capability were fabricated and briefly life tested. (OSW)
W74-00316

DEFINITION OF REVERSE OSMOSIS REQUIREMENTS FOR SPACECRAFT WASH WATER RECYCLING,
McDonnell Douglas Astronautics Co.-West, Huntington Beach, Calif.
D. F. Putnam, and G. W. Wells.
Available from the National Technical Information Service as PB-222 943, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 861, November 1972. 189 p, 41 fig, 23 tab, 35 ref. 14-30-3062.

Descriptors: *Reverse osmosis, *Membranes, Separation techniques, Membrane processes, Filtration, Permeability, Pressure, *Recycling, *Waste water treatment, Water quality standards.
Identifiers: Wash water, Waste water, *Wash water recovery, Space mission water requirements, Skylab, Multifiltration.

A six-man, reverse osmosis (RO) wash water recovery system that offers the dual advantages of lower equivalent weight and lower cost than competing wash water recovery techniques is defined and evaluated. The system meets the basic requirements of the advanced Skylab, the MDAC six-man modular space station, and the Space Station Prototype (SSP) program. Major design considerations include: Wash water requirements; Compatible cleansing agents; A theoretical estimate of the contaminants found in wash water, projected for the typical astronaut's work and exercise regimen as well as for a typical test subject; A standard procedure for producing used wash water similar to that projected for space vehicles; Wash water and potable water standards suggested by the National Academy of Sciences; A mass balance analysis and computer results that project concentrations of the major chemical contaminants expected in the reverse osmosis feed, product, and brine streams for various water recovery and solute rejection factors; A computerized parametric study of RO module sizing factors; Tradeoff studies comparing reverse osmosis to other methods of wash water recovery; and A detail design specification for a six-man RO unit for wash water recovery in a manned chamber test. (OSW)
W74-00320

FILTRABILITY OF WATER-TREATMENT-PLANT SLUDGE,
Auburn Univ., Ala. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05F.
W74-00387

ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
R. A. Nordstedt.
PH D Dissertation, 1969. 101 p, 17 fig, 25 tab, 23 ref.

Descriptors: *Farm wastes, Odor, *Waste disposal, *Waste storage, Air pollution, Livestock, *Feed lots, Fertilizers, Nutrients, Nitrates, Effluents, Diffusion, *Mathematical models.
Identifiers: Scheduling model.

Systems which interact with storage and land disposal of farm wastes were analyzed and relevant interfaces and variables were identified. A mathematical model describing storage of wastes and their timely disposal on agriculture land was developed and tested. Odor nuisance potential of farm wastes spread on land was also deliniated. A scheduling model was developed. It could be an effective tool in the design and operation of waste storage and land disposal systems. The model takes into account all important system variables. The waste storage facility was the most significant investment, based on results of the scheduling study. Nutrient effectiveness as afunction of time and land availability were significant. The pattern of the latter was a critical factor in determining minimum storage capacity. (Frantz-East Central)
W74-00393

WATER POLLUTION BY SWINE PRODUCTION OPERATIONS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
J. W. D. Robbins.
PH D Dissertion 1970. 440 p, 51 fig, 48 tab, 57 ref.

Descriptors: Effluents, Waste disposal, Hydrographs, *Hogs, *North Carolina, Nutrients, *Lagoons, Soils, Runoff, Influent, Bacteria, Surface waters, *Water pollution, Drainage, Streams, *Farm wastes, Hydrologic systems, Sampling, Biochemical oxygen demand, Nitrogen, Phosphates, Biodegradation.
Identifiers: Organic carbon.

Seven swine production operations, three using lagoons, one direct discharge, two land disposal, and one control watershed were studied to determine the extent of effluent contribution to stream pollution. Data were collected to determine the effluent strength to be discharged into streams. An analysis was made for more than 1000 effluent and stream samples. An organic carbon analysis was successful in determining strengths of wastes and waste waters. The biochemical oxygen demand (BOD) total organic carbon (TOC) ratio provided an indication of the ease of biodegradation and/or the degree of stabilization. It was found that anaerobic lagoons are not satisfactory as the sole means of treating hog wastes. Direct discharge of wastes into water creates gross pollution and should be prohibited. Land disposal was the superior method for protecting water quality. Slope, degree of erosion, and drainage patterns are the important factors in determining the quality of streams draining agricultural basins. (Frantz-East Central)
W74-00394

ENGINEERING AGRICULTURAL WASTES,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
B. J. Barfield, H. E. Hamilton, and I. J. Ross.
In: Quality of the Environment, Socio-Economic, Biological and Engineering Aspects, Papers presented at the College of Agriculture Annual Conference, University of Kentucky, January 5-7, 1971. p 14-21 (1971), 3 fig.

Descriptors: Dehydration, Land use, Proteins, Erosion, Technology, *Waste disposal, Lagoons, Kentucky, Insecticides, Odor, Livestock, Oxidation lagoons, *Farm wastes, *Air pollution, *Water pollution, *Soil contamination.
Identifiers: Composting, Microbial disposal.

The extension of cities into farming areas, demands for more uniform quality products, increased farm production and increasing demands

for processed foods are among recent trends causing problems for agricultural waste management. Soil erosion accounts for approximately 88% and livestock wastes for 11% of all agricultural pollution. But the amount of livestock waste that must be handled by mass management methods is expected to double by 1980. Soil disposal and microbial disposal media are most common while composting and dehydration are also used. All agriculture waste problems must be met with technological, social, and economical acceptability. (Frantz-East Central)
W74-00397

COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES,
Texas Tech Univ., Lubbock. Dept. of Chemical Engineering.
H. W. Parker, C. J. Albus, Jr., and G. L. Smith.
Paper 43 b-rv, presented at the 74th National Meeting, American Institute of Chemical Engineers, New Orleans, March 12, 1973. 5 fig, 4 tab, 17 ref.

Descriptors: *Solid wastes, *Costs, Cattle, Feedlots, Waste disposal, *Recycling, Electricity, *Farm wastes, Gases, Fuels, Fertilizers, *By-products, Sodium chloride, Pollution abatement.
Identifiers: *Pyrolysis, Municipal wastes, *Retort, Char.

Conceptual process designs which utilize the recently developed TTU retort to pyrolyze 2,000 tons per day of either municipal solid waste or cattle feedlot waste are reported. The major product of these processes is the production of 30 megawatts of electricity. A governmental entity which could finance the required 15 million dollar investment with 6 per cent bonds over a 20 year period would have to charge users $1.70 per ton of municipal refuse processed or $0.70 per ton of feedlot waste pyrolyzed. (East Central)
W74-00404

CONTINUOUS SOLID WASTE RETORT - FEASIBILITY STUDY,
Texas Tech Univ., Lubbock. Dept. of Chemical Engineering.
J. R. Massie, Jr., and H. W. Parker.
Paper No 43a presented to the 74th National Meeting of the American Institute of Chemical Engineers, New Orleans, March 12-15, 1973; 31 p, 12 fig, 6 ref.

Descriptors: *Cattle, *Farm wastes, *Waste disposal, Recycling, *Solid wastes, Oxidation, Temperature, Energy, By-products, Economics, Texas, Air pollution, Water pollution, Drying.
Identifiers: *Pyrolysis, *Refuse retort, Municipal refuse, Agricultural crop wastes, Char product, Fuel.

Continuous pyrolysis of a solid waste, cattle manure containing 30% moisture, was demonstrated in a six inch diameter retort at a mass flow rate of 136 lb/hr ft2. The retort was an open cylinder with a grate at the bottom. Cyclic injection of oxygen containing and oxygen free gas served to limit the heated zone of the retort to its midsection, which contained no mechanical parts. Maximum temperatures in the hot zone were controlled by mixing oxygen free gas with the injected air. This retort may also be used for municipal refuse, agricultural crop waste, or natural resources such as oil shale and coal. When integrated into a process, energy and by-products can be recovered from the retort as justified by economics, also air and water pollution problems can be easily controlled. (East Central)
W74-00405

CONVERSION OF URBAN REFUSE TO OIL,
Bureau of Mines, Pittsburgh, Pa. Pittsburgh Energy Research Center.
H. R. Appell, I. Wender, and R. D. Miller.
Bureau of Mines Solid Waste Program, Technical Progress Report-25, May 1970. 5 p, 3 tab.

Descriptors: *Recycling, Temperature, *Sewage sludge, *Oil, Water, Gas, Steam, Sulfur, Organic matter, *Fuels.
Identifiers: Processing, Furnace, *Urban refuse, Cellulosic wastes, Carbon monoxide, *Conversion.

Urban refuse, cellulosic wastes, and sewage sludge have been converted to heavy oil by heating under pressure with carbon monoxide and steam. Conversions of the organic matter to oil, water, and gas have averaged near 90 percent at temperatures of 250 deg to 400 deg C and pressures of 1,500 to 5,000 psi. The yield of oil, based on the dry organic matter of the waste materials, is usually near 40 percent. This is the equivalent of more than 2 barrels of oil per ton of dry, ash-free waste material. The oil from urban refuse and cellulosic wastes has a sulfur content near 0.1 percent. This low sulfur content makes the oil from refuse a desirable source of fuel oil. (East Central)
W74-00406

COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE,
Agricultural Research Service, Beltsville, Md.
R. W. Miller, C. H. Gordon, N. O. Morgan, M. C. Bowman, and M. Beroza.
Journal of Economic Entomology, Vol 63, No 3, p 853-855, June 1970. 3 tab, 14 ref.

Descriptors: *Feeds, *Additives, *Cattle, *Farm wastes, Dairy industry, *Mortality, Milk, *Insecticides, Larvae.
Identifiers: *Coumaphos, *House flies, Musca domestica L.

The mortality of first-stage larvae of the house fly, Musca domestica L., seeded into the manure of dairy cows consuming O-144 ppm coumaphos in their ration increased as the concentration of coumaphos in the ration was increased. At the 144 ppm level, larval mortality approached 100%. Although coumaphos residues were found in the feces no residues (<0.002 ppm) appeared in the milk of cows at any level of coumaphos fed. Neither feed intake nor milk production was affected by the feeding of coumaphos. The blood cholinesterase of 1 cow fed 150 ppm coumaphos over a 6-week period dropped to 20% of pre-experimental levels. (East Central)
W74-00411

A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. L. Day, and B. G. Harmon.
Paper No 72-954 presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972. 10 p, 5 fig, 7 tab, 21 ref.

Descriptors: *Recycling, *Feeds, *Swine, *Farm wastes, Aerobic conditions, Water, Nutrients, *Oxidation lagoons, Proteins.
Identifiers: Odor control, Rats, *Waste management.

An intriguing amount of protein was noticed in swine oxidation ditch mixed liquor at the University of Illinois in 1967. Studies have been in progress since then to measure the nutritive value of the aerobically processed product and use it as a feed supplement in feeding trials to rats and hogs. Several methods of concentrating and feeding the product have been tried. Utilizing th s product provides a source of water and nutrients for swine while minimizing environmental pollutants (air, water, soil). There is odor control and little if any effluent from the building. The results have been very favorable and economics appear competitive with other methods of waste management with a high degree of pollution control. (East Central)
W74-00412

NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED,
T. Zurowski.
Feedlot Management, Vol 15, No 8, p 26, Aug. 1973. 1 fig.

Descriptors: *Recycling, *Farm wastes, *Cattle, *Feed lots, *Nutrients, *Feeds, Economics, Bacteria.
Identifiers: *Refeeding, Cowmel, Farm Ecology Company, Food and Drug Administration, *Cowdominium.

A Washington operation, Farm Ecology, has made plans for a cowdominium. This is a feed storage and a waste conversion plant. There the wastes are subjected to heat, pressure and either acidic or alkaline chemicals. The recycled product, Cowmel, is a highly nutritious and finely ground pellet. Economic feasibility and FDA approval is presently uncertain. (Frantz-East Central)
W74-00415

A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
H. L. Person, J. R. Miner, T. E. Hazen, and A. R. Mann.
Paper No 72-439 presented at the 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972. 30 p, 2 tab, 8 fig, 6 ref.

Descriptors: *Hogs, *Waste treatment, *Farm wastes, Feed lots, Iowa, Aerated lagoons, *Oxidation lagoons, Effluent, Nutrients, Bacteria, Fungi, Slime, Odor, Pumping, Maintenance, Water quality.
Identifiers: *Waste transport, Waste management systems, Rotating biological contactor, Flushing gutter, Hydraulic cleaning.

Four engineers have demonstrated and evaluated three systems for hydraulic transportation and disposal of manure. The aeration basin, lagoon aeration basin, and rotating biological contactor systems all successfully used treated effluent as a cleaning medium in swine farro ing and finishing build ngs. Aeration basins treated liquid manure. Pumping was done economically and excess water proved virtually odorless. The process didn't add significantly to either water pollution or animal health problems. Systems and equipment are described in detail. (Frantz-East Central)
W74-00416

HIGH-TEMPERATURE, HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
F. A. Payne, I. J. Ross, H. E. Hamilton, and J. D. Fox.
Paper No. 72-450 presented at the 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, 22 p, 6 fig, 1 tab, 17 ref.

Descriptors: *Farm wastes, *Poultry, *Waste treatment, *Recycling, *Temperature, *Pressure, Moisture content.
Identifiers: *Extrusion, Thermal destruction, Uric acid, Chemical changes, Physical changes, Sterilization, Flash volitalization, Microbial organisms.

Chicken excreta and an excreta-feed mixture were extruded at a temperature range of 250-300F. for periods of 8.6 to 21.4 seconds. Pressures of 300 to

600 psi were utilized with the high temperatures to aid in microbial destruction. An analysis includes chemical and physical changes in the extended material. Also given is an equation which can be used to predict microbial destruction. When extruded, chicken manure (which normally contains disease organisms) may become a versatile, low-cost, and highly productive food material. (Frantz-East Central)
W74-00418

HUMAN AND ANIMAL WASTES AS FERTILIZERS,
Metropolitan Sanitary District of Greater Chicago, Ill.
J. R. Peterson, T. M. McCalla, and G. E. Smith.
In: Fertilizer Technology and Use, 2nd edition, Soil Science Society of America, p 557-596, 1971. 8 fig, 27 tab, 42 ref.

Descriptors: *Farm wastes, *Sewage, *Waste disposal, Irrigation, Nitrates, Soil profiles, Lagoons, Pathogenic bacteria, *Fertilizers, *Water pollution, *Soil contamination, Odor, Leaching, Chemical properties, Physical properties, Microbial composition, Crops, Toxicity.
Identifiers: *Human wastes, Plant yields, Digested sludge.

Solid waste from municipal wastewater treatment plants in the United States is analyzed quantitatively and qualitively. If properly digested, the sludge has little odor and is relatively free of pathogens. The use of digested sludge to ameliorate spoils has been proven. Three years' use of digested sludge on corn land has resulted in increased grain yields with no visual toxic symptoms to the plants. Qualitative and quantitative studies were also made on animal wastes. Although most pathogens are generally destroyed in the holding of wastes, weed infestations may be a problem with the application of animal waste to soil. Specific instances of waste utilization for soil improvement are cited for various states. (Wetherill-East Central)
W74-00419

CONTINUED RECYCLING OF CATTLE MANURE,
California Univ., Davis.
C. L. Ferrell, and W. N. Garrett.
Proceedings, Western Section, American Society of Animal Science, Vol 24, p 415-419, 1973. 5 tab, 5 ref.

Descriptors: *Cattle, *Farm wastes, *Recycling, Nitrogen, Calcium, Nutrient requirements, *Waste disposal, California.
Identifiers: Ration, Digestion stalls, Forced-air ovens, Digestibility.

Four Hereford steers were confined in digestion stalls and fed the basal ration at a maintenance level. Their manure and urine were recycled in forced air ovens at 100C. for 48 hours. The recycled wastes were mixed 50:50 with the basal ration. Resulting wastes were similarly treated and mixed, digested, then recycled again. The less digestible components of the feces increased while digestible components decreased substantially during each recycling. Less energy was digested in subsequent refeeding. Mineral and nitrogen content increased with each recycling, resulting in the only significant nutritional value of manure after recycling. (Frantz-East Central)
W74-00424

ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
D. R. Price, A. T. Sobel, and H. R. Davis.
Paper No 72-806 presented at the 1972 Winter Meeting of the American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972. 12 p, 9 fig, 3 tab.

Descriptors: *Poultry, Odor, Nutrients, *Recycling, *Farm wastes, Physical properties, Moisture, Fertilizers, *Waste disposal, New York, *Drying.
Identifiers: In-house drying, High-rise poultry house, Circulating fans, Exhaust fans, Drying costs.

Forced air over manure removes water continuously in a high rise poultry house designed to house 30,000 caged birds. The drying process removes one-half of the wastes' total weight and reduces odor by minimizing bacterial activity. The dried manure is spread only once a year, thus recycling nutrients through cropland. Design figures for a high-rise poultry house and operation costs for the drying system are included. (Frantz-East Central)
W74-00426

EFFECTS OF SWINE LAGOON EFFLUENT ON THE SOIL AND PLANT TISSUE,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
C. V. Booram, T. E. Hazen, and L. R. Frederick.
Paper No 73-239 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, Kentucky, June 17-20 1973. 19 p, 17 tab, 1 fig, 16 ref.

Descriptors: *Hogs, Cattle, Iowa, *Farm wastes, Confinement pens, *Lagoons, Anaerobic conditions, *Effluents, *Nutrients, Electrical conductance, Salts, *Waste disposal, *Irrigation, *Toxicity, *Water pollution, Corn (Field), *Soil contamination, Water quality.
Identifiers: Clarion-Webster soil, Tile-drained grass plots, Plant tissues.

Twelve 40 x 60 foot tile drained plots of Clarion-Webster soil were given applications of anaerobic lagoon effluent. The soil received 0, 3.7, 11.3, and 22.6 inches of effluent per season. There were no significant plant population differences at the 0.10 level. Corn tissues were analyzed for 14 nutrients. (N,P,K,Mg,Ca, Na,Si,Mn,Fe,Cu,Zn,Al,Sr, and Mo). In the tissue analysis P, Na, Fe and Al increased while Mg content decreased with increasing applications of effluent. After 4 years of anaerobic lagoon effluent applications the electrial conductivity of the soil showed little change. (Frantz-East Central)
W74-00428

RECOVERY OF ANIMAL FEED FROM CATTLE MANURE,
Agricultural Research Service, Peoria, Ill. Northern Marketing and Nutrition Research Div.
R. W. Jones, J. H. Sloneker, and G. E. Inglett.
In: Proceedings 18th Annual Institute of Environmental Sciences, (1971). p 267-269, 3 tab, 17 ref.

Descriptors: *Recycling, *Farm wastes, *Cattle, *Feed lots, Waste disposal, Amino acids, Proteins, Filtration, Centrifugation, Illinois.
Identifiers: Fractionating.

In the United States over 10 million tons of high grade protein are produced annually in cattle manure. Separating useful feed from fecal waste has become a valuable process which lowers feed costs and aids in waste disposal. Four methods for fractionating manure to remove undesirable constituents to produce high-protein feed supplement are described. Manure may be refined to remove the residue fraction, yielding a soluble fraction and a feed fraction that contains 64% of the original nitrogen. The feed fraction is higher in amino acid content than corn or wheat. The average steer annually produces $34 to $59 worth of feed fraction. Feed savings alone could be used to properly dispose of less usable waste fractions. (Frantz-East Central)
W74-00429

PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOSAL LAGOONS,
Agricultural Research Service, Washington, D.C. Agricultural Engineering Research Div.
H. J. Eby, and V. P. Singh.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price $0.15. Production Research Report No 142, April, 1972. 8 p, 2 fig, 2 tab.

Descriptors: *Recycling, Nutrients, Waste water, *Lagoons, *Algae, Bacteria, *Sewage, Oxidation, Climatic zones, Proteins, Farm wastes, *Waste water treatment, *Nutrient removal, *Cyanophyta.
Identifiers: *India, Waste disposal lagoons, Seasonal growth.

This research provided a starting point for expanding feed production and aiding in the biological purification of waste water. Research in India revealed that blue-green algae have self-limiting tendencies and may be used advantageously. Since growth periods in the species vary, scientists might possibly anticipate each specie's population peaks thereby controlling algae growth. Harvesting of algae serves two purposes: (1) to remove organic matter thus preventing it from becoming a pollutant, and (2) to serve as potential livestock and poultry feed. (Frantz-East Central)
W74-00430

METHODS FOR IMPROVEMENT OF TRICKLING FILTER PLANT PERFORMANCE. PART I. MECHANICAL AND BIOLOGICAL OPTIMA,
North Carolina Univ., Chapel Hill. Wastewater Research Center.
James C. Brown, L. W. Little, D. E. Francisco, and J. C. Lamb.
Copy available from GPO Sup Doc as EP1.23:670-73-047a, $2.30; microfiche from NTIS as PB-224 787, $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-047a, August 1973. 235 p, 37 fig, 28 tab, 58 ref. EPA Project 11010 DGA, Contract 14-12-505.

Descriptors: *Waste water treatment, *Trickling filters, *Performance, Optimization, *Operations, *Pilot plants, Filtration, Biochemical oxygen demand, Treatment facilities.
Identifiers: *Hydraulic surface loading, Nitrogenous oxygen demand.

The Chapel Hill high rate trickling filter plant which consists of two parallel and equal lines of treatment units was operated in parallel as two separate plants over a period of 26 months. Each side was operated with various fractions of influent flow and recirculation flow rates. Statistical analysis of operating results indicated that the common mathematical models are not reliable in predicting daily performance at the Chapel Hill plant. They are, however, useful in predicting long term average performance. Recirculation ratios as high as 3.0 proved beneficial at total hydraulic loadings of less than 20 mgad. Operation above this loading is not currently feasible at Chapel Hill. The hydraulic surface loading of the final settling tanks was found to have a significant effect on overall plant performance. A surface loading of 500 gpd/sq ft is recommended for the design of final tanks in new plants. Pilot plant studies using 4-foot diameter rock filters indicate a significant advantage for two-stage filtration even though the hydraulic loading on each stage may be double that for single-stage operation. Pilot plant studies of activated sludge treatment of trickling filter effluents were conducted. The process proved effective in improving removal of BOD, if effective final solids removal facilities are provided. The process also proved effective in reducing nitrogenous oxygen demand. (EPA)
W74-00431

INDIVIDUAL HOME AEROBIC WASTEWATER TREATMENT SYSTEMS,
Colorado Univ., Boulder. Dept. of Civil and Environmental Engineering.
E. R. Bennett, K. D. Linstedt, and R. N. McBride.
Trans. available from University of Kansas, Lawrence 66044, Price: $5.00. In: Transactions of the Twenty-third Annual Conference on Sanitary Engineering presented by School of Engineering and Conference and Institutes. Division of Continuing Education , University of Kansas, are presented February 7, 1973, p 71-96, (1973). OWRR A-021-COLO (1).

Descriptors: *Septic tanks, *Aerobic treatment, *Colorado, Operations, *Waste water treatment, Costs, *Equipment, *Waste water disposal, Performance, Treatment facilities.
Identifiers: *Evaporation-transpiration beds.

Descriptions are presented of the major types of equipment used in individual home wastewater disposal systems in Colorado. Comparisons of operation, cost and effluent quality for septic and aerobic systems and a few details on evaporation-transpiration beds are included.
W74-00434

REPORT TO THE GOVERNOR AND THE INTERIM FINANCE COMMITTEE: ALTERNATIVE RECOMMENDATION, LAS VEGAS WASH/BAY POLLUTION ABATEMENT PROJECT.
Clark County Board of County Comissioners, Nev.

September, 1973. 7 p, 2 fig.

Descriptors: *Waste water treatment, *Pollution abatement, *Nevada, Water reuse, Colorado River.
Identifiers: *Waste water reclamation, *Las Vegas (Nev).

Pursuant to Nevada statute recognizing Clark County as the instrument of government responsible for development and implementation of a pollution abatement plan for the Las Vegas Wash-Lake Mead area, the Board of County Commissioners recommends that an alternative be developed for the plan proposed by the Las Vegas Valley Water District. Reclamation of wastewater, in-valley irrigation, power and industrial uses, and possible future groundwater recharge will be emphasized in the forthcoming recommended plan, whereas export of wastewater was emphasized by the Water District's earlier plan. Selected staff, contractual rights, and obligations of the Las Vegas Valley Water District have been transferred to Clark County in order to insure orderly transfer of pollution abatement project responsibility. A program outline developing and recommending water standards, evaluating methods and costs of meeting those standards, and developing uses for reclaimed wastewater, 'Advanced Wastewater Treatment of Effluents from the City of Las Vegas and Clark County Sanitation District Wastewater Treatment Plants,' has been prepared. The County Commissioners have indicated an intent to plan, design, and construct facilities necessary to implement the wastewater management plan with consultation from Burrows, Smith and Company of Salt Lake City. Committees will be established to explore possible contracts with the Nevada Power Company or others wishing to acquire secondary water rights and to determine community desires for recreational use of Las Vegas Wash. A timetable for pollution abatement project actions from July, 1973 through July, 1974 is presented. (Stein-North Carolina)
W74-00440

METROPOLITAN COUNCIL FIVE-YEAR CAPITAL IMPROVEMENT PROGRAM FOR SEWERAGE FACILITIES.
Metropolitan Council of the Twin Cities Areas, Minn.
For primary bibliographic entry see Field 05G.
W74-00450

SEWAGE AND WASTE CONTROL RULES AND REGULATIONS FOR THE METROPOLITAN DISPOSAL SYSTEM.
Metropolitan Sewer Board, St. Paul, Minn.
For primary bibliographic entry see Field 05G.
W74-00452

WATER QUALITY PROGRAM FOR OAHU WITH SPECIAL EMPHASIS ON WASTE DISPOSAL: FINAL REPORT.
Engineering-Science, Inc., Honolulu, Hawaii; Dillingham Environmental Co., Honolulu, Hawaii; and Sunn, Low, Tom and Hara, Inc., Honolulu, Hawaii.

Prepared for City and County of Honolulu, Department of Public Works, February, 1972. 336 p, 36 fig, 89 tab, 35 ref.

Descriptors: *Waste water disposal, *Waste water treatment, *Hawaii, *Oahu, *Honolulu, Sewage disposal, Runoff, Water reuse, *Water quality standards, Oceanography, Costs, Financing.
Identifiers: Waste loads.

A consortium of three firms allocated components of this detailed wastewater disposal study among themselves. Wastewater generation on Oahu in 1972 was estimated to be 109 mgd and is projected to increase to about 265 mgd by 2020 due to population increases. About half the 1970 discharge received no treatment, resulting in deterioration of water quality. Special emphasis is given to wastewater disposal problems in Mamala Bay (off Honolulu's Sand Island treatment plant). Pearl Harbor, and Kaneohe Bay. Water quality objectives set by the State Water Quality Standards were reviewed and quantified when appropriate. The design of water quality control systems is directed toward conservation of corals and other aquatic organisms, protection of aesthetic qualities, and protection of recreational uses of waters. Two fundamental objectives are minimization of deleterious discharges and minimization of concentrations of deleterious discharges which cannot be avoided. Advanced primary treatment and discharge via a 300-feet-deep ocean outfall was recommended for the Sand Island treatment facility. Secondary treatment and reuse of water for sugar cane irrigation was recommended for the Pearl Harbor area. Upgrading of existing facilities and discharge via a deep ocean outfall off Mokapu point was recommended at Kaneohe Bay. Recommendations are made for wastewater collection, treatment, and disposal in other wastewater systems. Construction costs of $277 million current dollars and a 50-year phasing program are considered. Specific recommendations are made for future studies. (Stein-North Carolina)
W74-00456

CENTRAL FRESNO COUNTY WATER AND LIQUID WASTE PROGRAM: VOLUME I--FINDINGS, CONCLUSIONS, RECOMMENDATIONS.
Grunwald, Crawford and Associates, Inc., Fresno, Calif; and Engineering-Science, Inc., Fresno, Calif.
For primary bibliographic entry see Field 03D.
W74-00457

DESMIDIACEAE OF WASTE WATERS, (IN RUSSIAN),
Kharkov State Univ. (USSR).
T. V. Dogadina.
Biol Nauki. Vol 15, No 7, p 76-81. 1972.
Identifiers: Chemistry, *Desmidiaceae, Morphology, *Waste water treatment, Treatment ponds, Algae.

Eleven species and 1 form of Desmidiaceae were encountered in water treatment ponds. A list of the algae with an indication of some morphological features, type of pond, and chemical composition of the water is given. The indicator value of 2 spp. is suggested.--Copyright 1973, Biological Abstracts, Inc.
W74-00485

5E. Ultimate Disposal of Wastes

COST-EFFECTIVENESS ANALYSIS OF DISPOSAL SYSTEMS,
M. L. Popovich, L. Duckstein, and C. C. Kisiel.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 99, No EE5, Proceedings paper No 10104, p 577-591, October 1973. 2 tab, 25 ref.

Descriptors: *Waste disposal, *Water pollution, *Environmental engineering, *Solid wastes, *Incineration, *Alternative planning, Groundwater, Natural resources, Byproducts, Utilities, Evaluation, Decision making, Systems analysis, *Arizona.
Identifiers: *Cost-effectiveness, *Tucson (Ariz), Sanitary landfill, Sensitivity analysis.

A technique is proposed for evaluating alternative waste disposal methods in order to choose the one that will best meet a community's requirements. Using Kazanowski's standardized cost-effectiveness methodology, alternative systems are compared for effectively disposing 4 lbs to 5 lbs of municipal refuse per person per day in urban communities of the United States. The criteria for studying this problem are often limited to cost or marketable measures; in contrast, use of a cost-effectiveness approach allows the inclusion of nonquantifiable measures of effectiveness such as public acceptance, political factors, health risks, environmental constraints, soil benefits, and potential groundwater pollution. Data from a case study in Tucson, Arizona are used to illustrate the problem and methodology. The use of sensitivity analysis for evaluating uncertain factors is discussed. The three main areas of uncertainty in the application of the methodology are: (1) Determination of goals; (2) identification of criteria; and (3) determination of the capabilities of each alternative system in terms of the criteria chosen. (Bell-Cornell)
W74-00184

ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00393

ENGINEERING AGRICULTURAL WASTES,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00397

COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES,
Texas Tech Univ., Lubbock. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W74-00404

CONVERSION OF URBAN REFUSE TO OIL,
Bureau of Mines, Pittsburgh, Pa. Pittsburgh Energy Research Center.
For primary bibliographic entry see Field 05D.
W74-00406

A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00412

RECOVERY OF ANIMAL FEED FROM CATTLE MANURE,
Agricultural Research Service, Peoria, Ill. Northern Marketing and Nutrition Research Div.
For primary bibliographic entry see Field 05D.
W74-00429

SOLID WASTE MANAGEMENT.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 05G.
W74-00449

WATER QUALITY PROGRAM FOR OAHU WITH SPECIAL EMPHASIS ON WASTE DISPOSAL: FINAL REPORT.
Engineering-Science, Inc., Honolulu, Hawaii; Dillingham Environmental Co., Honolulu, Hawaii; and Sunn, Low, Tom and Hara, Inc., Honolulu, Hawaii.
For primary bibliographic entry see Field 05D.
W74-00456

5F. Water Treatment and Quality Alteration

SELECTIVE DESTRUCTION OF BACTERIA,
R. R. Meyers.
U. S. Patent No. 3,753,886, 3 p, 3 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 913, No 3, p 945, August 21, 1973.

Descriptors: *Patents, *Waste water treatment, Liquid wastes, *Bacteria, Electricity, *Water purification, Water quality control, Treatment, *Water treatment, *Electrolysis.

This water purification treatment consists of selective killing of certain bacteria. The liquid is deposited within a container and an approximately 60 c.p.s. alternating electrical current of 2-8 amperes at 7-28 volts is passed through the liquid. The muscles of the bacteria are vibrated until death results. With the use of alternating current, no metal hydroxide is produced at least at 60 c.p.s. or higher. (Sinha-OEIS)
W74-00083

EFFECTS OF WATERSHED DEVELOPMENT ON WATER QUALITY,
Tennessee Valley Authority, Chattanooga. Water Quality Branch.
For primary bibliographic entry see Field 05C.
W74-00118

TASTE THRESHOLDS OF HALOGENS IN WATER,
Environmental Protection Agency, Boston, Mass.
P. Bryan, L. Kuzminski, F. Sawyer, and T. H. Feng.
Journal of American Water Works Association, Vol 65, No 5, p 363-368, May 1973. 3 fig, 2 tab, 32 ref.

Descriptors: *Taste, *Water quality, *Water analysis, *Halogens, Bromine, Chlorine, Iodine, Chlorination, Laboratory tests, Measurement, Testing procedures, Disinfection, Water purification, Chemical properties, Potable water, Consumptive use.

The group of chemical compounds referred to as the halogens are effective water disinfecting agents, but when applied in sufficient concentration, they may lend an unpleasant taste and odor to water supplies. Perception of taste is a very individualized characteristic among humans, with some persons able to detect much smaller concentrations of chemicals than other people can notice. The tests described used a panel of eleven persons of both sexes and ranging in age from their early twenties to their mid-fifties. The testing consisted of tasting three samples of water, one of which contained a known concentration of the halogen compound and the other two were reagent water which had been distilled, demineralized and deodorized. The test results indicated that with chlorine residuals, taste threshold values varied quite significantly with pH, while for bromine and iodine there was no significant variation at different pH levels. (McKnight-Florida)
W74-00119

ENGINEERING ALTERNATIVES IN NATURAL RESOURCES DEVELOPMENT IN URBAN REGIONS,
Philadelphia Water Dept., Pa.
For primary bibliographic entry see Field 05D.
W74-00122

MUNICIPAL DESALTING STUDIES FOR SELECTED KANSAS COMMUNITIES,
Wilson and Co., Salina, Kans.
R. E. Crawford, R. P. Selm, G. D. Starrett, and C. A. Roberts.
Available from the National Technical Information Service as PB-222 942, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 869, March 1973. 209 p. 14-30-2738.

Descriptors: *Desalination, *Water reuse, Economics, Cost analysis, *Kansas, *Water softening, Brackish water, Potable water, Water treatment.

This is a summary report of municipal desalting studies for selected Kansas communities and a waste water reuse study utilizing desalting processes for Wichita, Kansas. The report includes a preliminary engineering and economic assessment of the feasibility and cost of applying various desalting techniques to improve the quality of potable water at Arkansas City, Damar, Girard, Hillsboro, Larned, Potwin, Towanda and a regional plan which included Potwin and Towanda. Total treatment systems were analyzed including optimization of pretreatment systems (sequestration, lime treatment, and lime-soda softening); application of six desalting techniques; and utilization of subsurface injection of brines (a Kansas regulatory requirement). Special consideration was given to protecting process equipment and subsurface brine receiving formations against calcium sulfate precipitation. The total treatment costs include supply, pretreatment, desalting, brine disposal, and delivered water facilities and ranged from a low of 47.2 cents/kgal to supply a peak demand of 5.0 MGD at Arkansas City to a high of 685.5 cents/kgal to supply a peak demand of 0.1 MGD at Damar. A special study was made at Wichita, Kansas wherein waste water from the City's secondary treatment facilities was returned for reuse after additional treatment which included lime treatment, ammonia stripping, filtration, carbon adsorption, chlorination, 30-day detention and desalting at a cost of 80.9 cents/kgal for a continuous demand of 10-20 MGD. (OSW)
W74-00156

A PROMISING APPROACH TO SOLVING A STREAM POLLUTION PROBLEM,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05D.
W74-00164

FABRICATION AND TESTING OF TUBULAR REVERSE OSMOSIS MODULES CONTAINING ULTRATHIN MEMBRANES FOR WET-DRY CYCLING OPERATIONS,
North Star Research and Development Inst., Minneapolis, Minn.
J. E. Cadotte, K. E. Cobian, and L. T. Rozelle.
Available from the National Technical Information Service as PB-223 137, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 874, June 1973. 25 p, 2 fig, 6 tab, 5 ref. 14-30-2883.

Descriptors: *Membranes, *Reverse osmosis, *Permeability, Separation techniques, Membrane processes, Brackish water, Thin films, Water purification, Water quality, Water treatment.
Identifiers: Ultrathin membranes, Cellulose acetate, Tubular membranes, Porous substrate.

The objective was to apply ultrathin reverse osmosis membranes to wet-dry cycling conditions with acceptable reverse osmosis performance. In the first phase the composite system of ultrathin cellulose acetate membranes on microporous polysulfone support films in 1/2-inch fiber glass tubes was shown to meet the specifications provided by the U.S. Army Mobility Equipment Research and Development Command. However, the adhesion of the ultrathin membrane to the polysulfone support was not strong enough to withstand high turbulence during filling of the modules. The objective of the second phase was to find a proper adhesive system for this composite membrane system to resist extreme flushing conditions while maintaining adequate flux, rejection, and wet-dry properties. An adhesive system including glyoxal in the Reten solution and 2,4 diamino-6-phenyl-s-trizaine (DPT) in the polysulfone liner was developed that looked promising in two-foot tubes. However, DPT was detrimental to the membrane in five-foot tubes (for the modules). It was found at the end of the program that DPT could be eliminated in another procedure used for producing a wet-dry membrane. After flushing tests in flat cells the membrane composites exhibited fluxes of 36 to 42 gfd and rejections of 91 to 94 percent (600 psi, 0.5 percent NaCl, and 25 deg C). (OSW)
W74-00313

FILTRABILITY OF WATER-TREATMENT-PLANT SLUDGE,
Auburn Univ., Ala. Dept. of Civil Engineering.
R. W. Glenn, J. F. Judkins, Jr., and J. M. Morgan.
Journal American Water Works Association, Vol 65, No 6, p 414-417, June 1973. 3 fig, 24 ref. OWRR A-024-ALA (4).

Descriptors: *Water treatment, Sludge, *Filtration, *Sludge treatment, Sulfates, Waste water treatment, *Coagulation.
Identifiers: *Alum sludge, Aluminum sulfate.

The use of aluminum sulfate (alum) as a coagulant for treating surface-water supplies was introduced in 1884. Since that time, the disposal of filter-backwash wastes and coagulant sludges has, in most cases, been accomplished by direct discharge to receiving streams. Under current guidelines, however, the sludge must be treated as a concentrated pollutant. The filtration possibilities of alum and some interesting new observations are discussed.
W74-00387

ON THE PROBLEM OF EMERGENCY-SUPPLY WITH DRINKING-WATER BY WAY OF SEITZ--FILTER, (IN GERMAN),
Mainz Univ. (West Germany). Hygiene Institut.
A. Hechmat.
Zentralbl Bakteriol Parasitnekd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 155, No 5/6, p 535-540. 1972. (English summary).

Identifiers: Bacteria, *Bacterio phage, *Filters, Phage, Poliovirus, *Seitz filters, *Potable water, *Water treatment, Germany.

Among the different germ-tight filters, which have come into use for the production of solutions free of bacteria, the Seitz-degerminating-layers have attained special interest. They gained their special position by means of the absorbing capacity of the asbestos-layers. The question how to procure drinking-water out of polluted water in case of need and catastrophies by way of Seitz-filters could not be answered sufficiently. The usability of the Seitz-degermination layer for the production of drinking-water in flood-disasters and inundations was tested; the water of the Rhine was taken for the tests. The differeing receptivity of the filters for the Newcastle-virus, T3-phage and the polio-virus, type II, seems to depend on the size of the virus and not on their concentration in the water. The break-through of the virus suspended in the Rhine water probably takes place sooner than of the virus bloated in springwater. Taking in account an appropriate safety-surplus a load on a Seitz-EKS-I filter for the emergency-supply with drinking-water up to a macimum of 10 1 waste-water or 2500 1 river water per cm2 is recommended. In practice these numbers are of little validity, since such a filter is already stopped up with 0.5 1 river-water per cm2. EKS-layers are undoubtedly permeable to virus, but the delay in this permeability is long enough to produce--in case of need a microbiologically faultless drinking water.--Copyright 1973, Biological Abstracts, Inc.
W74-00472

HYGIENIC EVALUATION OF THE QUALITY OF WATER OBTAINED BY MEANS OF ELECTRODIALYSIS DESALTING OF IMITATION SEA WATER, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 03A.
W74-00478

5G. Water Quality Control

METHODOLOGY FOR ASSESSING THE POTENTIAL IMPACT OF URBAN DEVELOPMENT ON URBAN RUNOFF AND THE RELATIVE EFFICIENCY OF RUNOFF CONTROL ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 02A.
W74-00001

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCES SYSTEMS, VOL. VI ESTIMATING ECONOMIES OF SCALE IN THERMAL ELECTRIC POWER SYSTEMS SUBJECTED TO ENVIRONMENTAL QUALITY CONSTRAINTS,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-00002

INTERACTION OF BULK PRECIPITATION, STREAM WATER, AND SEWAGE IN A SMALL WATERSHED NEAR OXFORD, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 02A.
W74-00005

NITRATE AND NITRITE VOLATILIZATION BY MICROORGANISMS IN LABORATORY EXPERIMENTS,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
J.-M. Bollag.
Copy available from GPO Sup Doc as EP1.23:660-73-002, $1.00; microfiche from NTIS as PB-224 467, $1.45. Environmental Protection Agency, Technology Series, Report EPA-660/2-73-002, August 1973. 65 p, 8 fig, 13 tab, 33 ref. EPA Project 16080 EIT.

Descriptors: *Denitrification, *Nitrates, *Nitrites, *Nitrogen cycle, *Soil microorganisms, Bacteria, Fungi, Microbial cultures, Nitrogen, Nitrous oxide, Environmental effects, Microorganisms, Water pollution control.
Identifiers: Optimizing denitrification, Nitrate-volatilizing microorganisms.

Microbial nitrate and nitrite volatilization was considered as a means to eliminate nitrogen from soil and water in order to inhibit the accumulation of nitrogenous substances as pollutants or health hazardous compounds. Therefore it was attempted to compare nitrate reducing microorganisms in their reactions to different environmental conditions in laboratory experiments. Changing oxygen concentration, pH, temperature, nitrate or nitrite concentration affected differently the denitrification process of various isolated microorganisms. Unfavorable growth conditions led to the accumulation of nitrite if nitrate served as substrate. It was found that certain soil fungi are also capable of volatilizing nitrogen as nitrous oxide. Biological and chemical factors were evaluated during nitrite transformation in autoclaved and non-autoclaved soil by determination of the evolvement of nitrogenous gases. During chemical nitrite volatilization, which occurred essentially at a low pH, the major gases evolved were nitric oxide and nitrogen dioxide, but if biological activity was predominant in a neutral and alkaline environment, nitrous oxide and molecular nitrogen were formed. The validity of laboratory observations in relation to field studies in the domain of denitrification is discussed and evaluated. (EPA)
W74-00008

LAND RECLAMATION AND RIVER POLLUTION PROBLEMS IN THE CROAL VALLEY CAUSED BY WASTE FROM CHROMATE MANUFACTURE,
Liverpool Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00045

STUDIES IN SWEDEN ON FEASIBILITY OF SOME METHODS FOR RESTORATION OF MERCURY-CONTAMINATED BODIES OF WATER,
Swedish Water and Air Pollution Research Lab., Stockholm.
A. Jernelov, and H. Lann.
Environmental Science and Technology, Vol 7, No 8, p 712-718, August 1973. 6 fig, 3 tab, 28 ref.

Descriptors: *Mercury, *Dredging, *Chemical precipitation, Bioassay, Fish, Sulfides, Hydrogen ion concentration, Path of pollutants, Absorption, Heavy metals, Water pollution effects, Sediments, Laboratory tests, On-site investigations, Lakes, Rivers, Turbidity, Binders.
Identifiers: *Methylation , *Mobilization, Bioaccumulation, Biotransformation, Lucioperca lucioperca, Biological samples, *Sweden, Covering, Lake Trummen, Lake Mellanfryken, Lake Garlangen, Hallsfjarden Bay, Morrumsan River, Removal.

Brief descriptions are given of laboratory experiments which were conducted to investigate ways of removing mercury from water or of preventing its transformation into forms which accumulate in fish. Dredging, which stirs and suspends the sediment, may increase mercury methylation. Drainage water from dredge spoils also may contain high concentrations of mercury. However, it may be possible to precipitate this mercury out of drainage water. Addition of sulfide ion converted divalent inorganic mercury to mercury sulfide and reduced the methylation rate of mercury as shown by tests in which mercury accumulations in fish were studied. Covering mercury deposits with mercury-binding or with inert material may reduce methylation rates, but the presence of benthic organisms, currents, and other disturbing influences may contribute to the mixing process thereby eliminating beneficial effects. Raising the pH of the water which favors production of dimethyl mercury, reduced the amount of mercury accumulated by fish. Field studies were made of five areas in Sweden, Lakes Trummen, Garlangen, Mellanfryken, Hallsfjarden Bay, and Morrumsan River, which had undergone various types of treatments similar to those investigated in the laboratory tests. The results from some of the methods are promising and warrant further investigation. (Little-Battelle)
W74-00060

NOXIOUS SUBSTANCES CONTAINED IN THE WATERS: THEIR ORIGIN, BEARING, AND THEIR ELIMINATION, (IN GERMAN),
Mainz Univ. (West Germany). Hygiene Institut.
For primary bibliographic entry see Field 05B.
W74-00065

POLLUTION SKIMMER,
B. J. Hoffman.
U. S. Patent No. 3,753,497, 3 p, 3 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 913, No 3, p 859, August 21, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Skimming, Separation techniques, *Pollution abatement, Equipment, Water pollution control, Water quality control.

The base of this skimmer contains a central drain and several troughs which extend outward from it. The troughs are skewed relative to radii to aid in the formation of a vortex within the drain. The base is supported by several lateral wings each having a density less than that of the liquid. A drain tube is connected to the lower end of the drain and after passing through a pump, discharges the matter into a surface material receptacle which is a multiple outlet container for separating immiscible liquids. A V-shaped weir surrounds the base and wings for use in flowing liquids. The skimmer, weir and a pump may be mechanically connected so all may float as a unit. (Sinha-OEIS)
W74-00084

CONVERGING VORTEX APPARATUS FOR SEPARATING OIL FROM WATER,
E. A. Boyd.
U. S. Patent No. 3,753,496, 4 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 913, No 3, p 859, August 21, 1973.

Descriptors: *Patents, Oil spills, *Oil pollution, *Pollution abatement, *Separation techniques, Water pollution control, Water quality control, Equipment, *Skimming.

This apparatus includes a vortex generator with means to induce rotary motion in fluids flowing through the generator. The generator is maintained in submerged position with its upper end near the water surface in close proximity to an oil slick. The oily water or film is sucked into the generator and then directed through the equipment to a remote reservoir where separation takes place. Screens are provided to filter the water and oil mixture as it is being drawn into the apparatus. The screens may be formed of 1/4 inch expanded metal to screen out large foreign objects which might affect the operation. The apparatus is supported by a triangular arrangement of spherical floats or buoys rigidly secured by a triangular frame. The apparatus is maintained in a stable operating position with the horizontal plane of its vanes parallel to the surface of the water. The

floats are spaced to permit a free, undistrubed flow of water and oil. When being used in conjuction with a support ship or barge, the casing can be suspended by suitable lines from a ship-mounted boom. An operator aboard ship manually manipulates a hoist line to maintain the casing at the desired level relative to the water line. Sinha-OEIS)
W74-00085

SEPARATING APPARATUS,
V. S. Aiello, J. P. Albanese, R. V. Anderson, and F. Platt.
U. S. Patent No. 3, 753, 492, 5 p, 8 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 913, No 3, p 858, August 21, 1973.

Descriptors: *Patents, *Separation techniques, *Oil spills, Equipment, *Oil pollution, Water pollution control, *Pollution abatement, Water quality control.

Separation of oil and water is accomplished by directing the water with a layer of oil floating on it into a vertical cylindrical tank extending above and below the liquid surface. At the bottom of the tank, an impeller maintains the liquid in rotation about a vertical axis, creating a vortex. The oil appears in the vortex as a layer of maximum thickness at the center. A float having a contour symmetrical about a vertical axis centers itself in the vortex. The float carries an outlet pipe for the oil whose open lower end is submerged in the liquid at the center of the vortex. The outlet pipe is preferably rigid, its top connects to a flexible pipe section which may move laterally by small amounts so as to allow the float to follow lateral movements of the vortex. The pipe is also vertically extendable, so as to adjust to changes in the liquid level with respect to the sides of the tank. The apparatus may be mounted on a twin hulled vessel and propelled through the water to remove an oil slick. The inlet for the oil and water mixture is at the bow end of the tank, with the water outlet at the stern. (Sinha-OEIS)
W74-00086

APPARATUS FOR REMOVING OIL FROM OIL-CONTAMINATED WATER,
J. Cincotta.
U. S. Patent No. 3,752,762, 2 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 913, No 2, p 654, August 14, 1973.

Descriptors: *Patents, *Oil pollution, Oil spills, *Oily water, *Filtration, *Pollution abatement, Water pollution control, Water quality control, *Industrial wastes, Liquid wastes, Separation techniques.
Identifiers: *Pumice stones.

Pumice stones are placed in a container having an open top, a removable bottom and porous opposed first and second side walls. Oil contaminated water is directed through the first porous side wall, through the container and out the second side wall. The pumice stones in the container absorb the oil from the water, and when they become saturated the bottom of the container is removed allowing the pumice stones to drop on a conveyor. The conveyor transports them to a steam-cleaning area. After being cleaned they are returned to be used again. (Sinha-OEIS)
W74-00087

METHOD FOR CONTROLLING ALGAE POLLUTION,
Kettering Scientific Research, Inc., Yellow Springs, Ohio. (Assignee)
R. W. Treharne, and T. E. Brown.
U. S. Patent No. 3,752, 747, 4 p, 2 fig, 2 tab, 11 ref; Official Gazette of the United States Patent Office, Vol 913, No 2, p 651, August 14, 1973.

Descriptors: *Patents, Eutrophication, *Electrolysis, *Bacteria, Algae, *Algal control, Water pollution control, Water quality control, *Pollution abatement, Azotobacter, E. coli.
Identifiers: Chromatium, R. rubrum.

The water is subjected to electrolysis with electrochemically inert electrodes or with an electrochemically active anode and an electrochemically inert cathode to destroy or to control the growth of algae. Most forms of algae are destroyed by impressing, per liter of water, about 15 volts and 150 milliamperes of electric potential between the electrodes over a 72 hour period. When an active anode is used it releases metal ions toxic to algae, and a detector electrode is used to sense the toxic ion concentration so that a predetermined concentration lethal to algae is maintained without rising to a level of being toxic to fish or humans. This system may be used for the destruction of E. coli, R. rubrum, Chromatium, Azotobacter, and other bacteria. (Sinha-OEIS)
W74-00088

OIL RECOVERY VESSEL,
Oil Recovery Systems, Inc., Mineola, N.Y. (Assignee)
E. E. Lithen.
U.S. Patent No. 3,752,317, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 913, No 2, p 547, August 14, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution control, *Pollution abatement, Water quality control, Equipment.
Identifiers: *Scoops.

The vessel's hull has a scoop projecting forward for collecting a mixture of oil and water from the surface of the body of water. The scoop is pivotally mounted and is vertically movable to compensate for sea conditions and changes in the waterline of the vessel. Fluid collected under the action of gravity and the forward motion of the vessel is directed through conduits into submerged separation tanks under conditions of laminar flow. After decanting, a pumping device causes removal of the collected oil. The oil is then transferred to storage tanks and the water is discharged. (Sinha-OEIS)
W74-00089

FLOATING OIL CONTAINMENT BOOM,
Murphy-Pacific Marine Salvage Co., New York. Merritt Div. (Assignee)
R. K. Thurman.
U. S. Patent No. 3,751,925, 3 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 913, No 2, p 447, August 14, 1973.

Descriptors: *Patents, Equipment, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Separation techniques, Water quality control.
Identifiers: *Booms.

This floating oil containment boom comprises floating units connected by flexible joints. Each unit consists of a rigid, flat barrier provided with a metal drum for supporting it in a vertical position in a body of water with part extending above the water surface and part submerged. Secured between adjacent units are flexible panels preferably made of waterproof textile material, which may extend below the barriers to register with flexible curtains of the same material attached to the bottoms of the barriers and weighted to keep them flat. Each unit is secured to strong lines which carry the stresses applied in towing or heavy seas and the leading unit in tow may be provided with a bow plane or like element to facilitate towing an assembly of units to or from a working location. (Sinha-Oeis)
W74-00090

GROUND-WATER NITRATE POLLUTION IN RURAL AREAS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05B.
W74-00095

MODIFICATION OF WATER QUALITY DURING ARTIFICIAL GROUNDWATER RECHARGE,
For primary bibliographic entry see Field 04B.
W74-00116

REGIONAL PERSPECTIVES,
Tennessee Valley Authority, Chattanooga.
A. J. Wagner.
In: The Nation's Environment--Problems and Action, p 19-30, 1971. East Tennessee State University, Johnson City.

Descriptors: *Planning, Water pollution control, *Soil contamination, *Alternative planning, Long-term planning, Future planning (Projected), Economic efficiency, *Regional development.
Identifiers: *Tennessee Valley.

The shift from an agrarian society to an industrialized one has caused man to lose touch with true quality in life. A major cause of this situation is the multiplicity of environmental ills associated with the age of technology. Technology itself, however, is not so much the villain as is what man has done with his technology. If nature is seen as an integrated system, with irrevocable relationships between air, water and land, then the problems of the environment can be seen in total perspective and a regional approach to planning becomes feasible. The Tennessee Valley is cited and discussed as a good example of how such a perspective can and does work--particularly in such nominally unrelated areas as garbage disposal, rural renovation, water and air pollution control and thermal pollution control. (Wadley-Florida)
W74-00123

WATER POLLUTION,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05A.
W74-00124

PROCEEDINGS: LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW.

Nebraska Center for Continuing Education, Lincoln, Nebraska, November 29-30, 1972, 133 p, 2 tab.

Descriptors: *Livestock, *Farm wastes, *Management, Air pollution, Water pollution, Soil contamination, *Waste treatment, Waste storage, Waste disposal, Runoff, *Feed lots.

A multi-disciplinary team effort revealed the objectives and priorities in fighting agricultural pollution. Specific governmental and university programs were pinpointed, outlined, and reviewed. The papers presented were, in most instances, rather general. (See W74-00126 thru W74-00144) (Frantz-East Central)
W74-00125

NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM,
Agricultural Research Service, Beltsville, Md.
R. G. Yeck.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 5-10, November 29-30, 1972.

Descriptors: *Farm wastes, *Feed lots, Groundwater, *Recycling, *Livestock, Air pollution, Water pollution, Soil contamination, Runoff, Waste disposal, *Waste treatment, Odor.

Identifiers: Livestock waste management research.

Farm waste research project areas are discussed in an overview. Some areas of research receive adequate concentration while other topics such as recycling farm wastes, are inadequately considered. Projects include those seeking to control feedlot runoff and odor due to land applications of farm wastes. Researchers are urged to cooperate and to work concurrently on related projects to prevent land, air, and water pollution. Recent cuts into research allocations necessitate increased teamwork. (See also W74-00125) (Frantz-East Central)
W74-00126

REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM,
Nebraska Univ., Lincoln. Agricultural Experiment Station.
R. W. Kleis.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska. p 11-15, November 29-30, 1972, 1 tab.

Descriptors: *Research and development, *Livestock, *Farm wastes, *Management, Air pollution, Water pollution, Waste treatment, Waste storage, *Waste disposal, Recycling, Nitrogen, Nutrients, Confinement pens, *Regional development.

Livestock waste management projects and objectives are listed for state agricultural experiment stations. The primary purpose is to enhance the total effectiveness of all participating agencies and institutions while preventing unnecessary duplication. Present efforts have been building up, as have problems of waste management, for fifteen years. Needed are projections of not only economic costs, but also of social and environmental costs. (See also W74-00125) (Frantz-East Central)
W74-00127

POLLUTION OF AIR, WATER, AND SOIL BY LIVESTOCK,
Agricultural Research Service, Lincoln, Nebr.
L. F. Elliott.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 23-28, November 29-30, 1972, 28 ref.

Descriptors: *Air pollution, *Water pollution, *Soil contamination, *Farm wastes, Feed lots, Odor, Surface waters, Groundwater, *Livestock, Spectroscopy, Chromatography, Nitrates, Oxidation, Soil profiles, Nebraska, Kansas.

Air, water, and soil pollution research projects are discussed. Air pollution studies include attempts at developing compounds which can reliably indicate odors. While surface water pollution from feedlots is no longer deemed a major problem, research has been necessary for the prevention of soil pollution and groundwater pollution at feedlot sites. Sealants in holding ponds and debris basins and management practices for land application of feedlot wastes are also being studied. (See also W74-00125) (Frantz-East Central)
W74-00128

APPLICATION, UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
H. Wittmuss.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 31-35, November 29-30, 1972.

Descriptors: *Waste disposal, *Waste treatment, *Farm wastes, *Livestock, *Feed lots, Runoff, Irrigation, Nitrates, Nebraska, Kansas, North Dakota.
Identifiers: Mounding.

Livestock waste disposal from unpaved, beef cattle feed lots has the greatest pollution potential. Separation of liquid and solid wastes is important. Separated liquids have been applied to cropped land at up to 36 inches a year for two years without problems, however, long range effects of effluent application need further study. Likewise needed is the determination of the highest sustained rates at which solid wastes may be applied without soil deterioration and salinization. Mounding sometimes aids in denitrifying wastes. Other waste management systems used with varying degrees of success are: (1) drying entire waste, (2) incineration, (3) composting, (4) refeeding, (5) protein production, (6) building blocks, (7) raw material for oil, and (8) methane production. (See also W74-00125) (Frantz-East Central)
W74-00129

DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS,
Agricultural Research Service, Lincoln, Neb.
J. A. Nienaber.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 39-43, November 29-30, 1972, 18 ref.

Descriptors: *Farm wastes, *Feed lots, Cattle, Runoff, Drainage, Flumes, Terracing, Nebraska, *Management, *Waste treatment, Waste disposal.
Identifiers: *Runoff control system, Debris basin, Holding pond, Disposal area.

A runoff control system has been successfully operated on two 1000 head feedlots. Designed from the University of Nebraska Field Laboratory, the system consists of three components: debris basin, holding pond, and controlled disposal area. This system was proven superior to the one-pond system for liquid and solid wastes. Broad basin terraces may be beneficial in flood protection as well as in runoff control. Shallow debris basins are recommended for minimizing waste odors. Wooden dams with crushed rock release runoff from debris basins. The suggested disposal area is from one half up to the full size of the feedlot itself. Rainfall, slope length, and size of operation are among factors which affect runoff control design. Alternative runoff control systems and their relative costs are discussed. (See also W74-00125) (Frantz-East Central)
W74-00130

CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF,
Agricultural Research Service, Lincoln, Neb.
J. R. Ellis.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 49-53, November 29-30, 1972, 29 ref.

Descriptors: Conductivity, *Farm wastes, Runoff, Thermal properties, Nutrients, Nitrates, Phosphorus, Ammonia, Pathogenic bacteria, Water pollution, *Physical properties, *Chemical properties, *Biological properties, Animal parasites, Amino acids, Waste disposal.
Identifiers: Pollution potential, Waste management, *Animal wastes runoff.

Chemical, physical, and biological properties of farm waste must be further studied to correctly determine the pollution and management problems they present. The pollution potential discharged into streams requires chemical analysis of farm wastes, while design of runoff control structures lends itself to determination of physical properties. Further research is likewise needed in assessing life of microorganisms in feces and in runoff control systems. Because comparatively little information has been established regarding the physical properties of farm waste, further research is suggested in characterizing feces, urine, and housed feed lot wastes, especially regarding gross energy, freezing point, and thermoconductivity. (See also W74-00125) (Frantz-East Central)
W74-00131

WASTE MANAGEMENT AND ANIMAL PERFORMANCE,
Nebraska Univ., Lincoln. Dept. of Animal Science.
S. Farlin.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 57-59, November 29-30, 1972, 5 ref.

Descriptors: *Feed lots, *Farm wastes, *Waste treatment, Nutrition, Nebraska, Missouri, Iowa, Minnesota, *Management.
Identifiers: Gains, Animal performance, Mounding, Cold/warm slot housing.

Increasing animal performance, hence profits, depends upon feed lot modifications such as mounding wastes in winter and decreasing cattle density. Also, cattle with access to sheltered lots generally show increased gains, higher grade carcasses, and higher dressing percentages than cattle in open lots. Additional research may be the key to making more accurate estimates on the effects of housing and waste management on returns from feeding cattle. (See also W74-00125) (Frantz-East Central)
W74-00132

EDUCATION, ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT,
Nebraska Univ., Lincoln.
E. A. Olson.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 63-66, November 29-30, 1972.

Descriptors: Nebraska, *Economics, Oxidation lagoons, *Waste disposal, Ventilation, *Farm wastes, Odor, *Feed lots, Cattle, Hogs, Inlets (Waterways).
Identifiers: *Voluntary waste control, *Regulatory waste control.

Problems associated with shifting from voluntary waste control to regulations adopted by the Environment Control Council are outlined. Inspections of feed lots and investigations of existing waste management systems are in progress. Also outlined is the educational program (including economic factors) coordinated by county extension agents, consulting engineers and the Department of Environmental Control. Maintenance of present systems and future research needs are discussed in outline form. (See also W74-00125) (Frantz-East Central)
W74-00133

PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT,
Nebraska Livestock Feeders Association, Fairmont. Environmental Management Committee.
W. Krejci.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 69-71, November 29-30, 1972.

Descriptors: *Feed lots, *Farm wastes, Runoff, Odor, *Cattle, *Hogs, Lagoons, Surface waters, Nebraska, Air pollution, *Legal aspects.

Livestock feeders have sacrificed some of their freedom for the improvement of the environment. Arguments and recommendations are considered from the feeders' viewpoint. Filtering runoff through fields is a suggested alternative to concentration of runoff into holding ponds. Also, swine wastes should be as much in governmental focus as are cattle waste problems. More extensive data will be required to control some feed lot runoff problems, but proper management and further governmental and educational cooperation will aid feeders. (See also W74-00125) (Frantz-East Central)
W74-00134

POLLUTION OF AIR, WATER AND SOIL BY LIVESTOCK,
Agricultural Research Service, Lincoln, Nebr.
T. M. McCalla, and G. E. Schuman.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 75-79, November 29-30, 1972.

Descriptors: *Air pollution, *Water pollution, *Soil contamination, *Feed lots, Odor, Runoff, Waste storage, Waste treatment, Waste disposal, Livestock, *Farm wastes, Nitrates, Groundwater.
Identifiers: Abandoned feedlot reclamation.

Although researchers have solved many problems, they have uncovered many areas which require further research. A standard method for defining odorous compounds is needed. More reliable maintenance and sealants are needed to prevent seepage into ground water. Experiments in land disposal should be carried out for at least ten years. (See also W74-00125) (Frantz-East Central)
W74-00135

APPLICATION, UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
O. E. Cross.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 83-89, November 29-30, 1972, 14 ref.

Descriptors: *Farm wastes, *Feed lots, *Waste disposal, *Recycling, Water pollution, *Application methods, Irrigation, Soil management, Physical properties, Chemical properties, Runoff, Groundwater, Effluents, Nitrates, Centrifugation, Conductivity, Phytotoxicity, Cattle, Hens, Turkeys.
Identifiers: Micronutrients.

Research plans for fourteen projects are given. Research objectives and problems to be faced are discussed. Current problems include waste management, waste utilization, runoff control systems, effluent disposal and effects of disposal on agricultural land. (See also W74-00125) (Frantz-East Central)
W74-00136

RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF CONTROL SYSTEMS,
Agricultural Research Service, Lincoln, Nebr.
N. P. Swanson.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 93-97, November 29-30, 1972, 4 ref.

Descriptors: *Feed lot, *Waste disposal, Nebraska, *Farm wastes, Pollutants, *Cattle, Gravity, Irrigation, Runoff, Effluents, Infiltration, *Waste management.
Identifiers: Buffer strips, Field disposal, *Waste runoff control.

Current research projects should partially resolve feed lot runoff problems, but the goal is set for 'zero pollution.' New plans and objectives for overland flow, buffer strips, feed lot floor design and topographical research are discussed. These methods require proof of environmental acceptability. Proper distribution of effluent is of major concern to the Soil Conservation Service. Odor, because of nuisance suits, may be the greatest runoff problem. The facilities of the University of Nebraska Field Laboratory and Meat Animal Research Center is aiding research in several runoff control areas. (See also W74-00125) (Frantz-East Central)
W74-00137

CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF,
Agricultural Research Service, Lincoln, Nebr.
C. B. Gilbertson.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 101-103, November 29-30, 1972, 29 ref.

Descriptors: *Farm wastes, *Physical properties, *Chemical properties, *Feed lots, Coliforms, Pathogenic bacteria, Lagoons, Management, *Waste disposal, Degradation, Runoff, Cattle, Water pollution sources, *Waste treatment.
Identifiers: Catonic nutrients, Mounding, Microbial properties.

Defining physical, chemical and microbial characteristics is basic to current and future farm waste disposal and runoff control. Three projects are discussed whose aims are determining physical and chemical properties in relation to the mechanics of waste disposal. Approximately three years will be required to complete needed research in these areas. (See also W74-00125) (Frantz-East Central)
W74-00138

WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK,
Agricultural Research Service, Clay Center, Nebr. Meat Animal Research Center.
T. E. Bond.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 107-110, November 29-30, 1972, 1 tab.

Descriptors: *Livestock, *Sheep, *Cattle, *Hogs, Nebraska, Recycling, Pollutants, Odor, Waste disposal, *Confinement pens, *Feed lots, Nutrients, Oxidation, *Waste treatment, Transportation.
Identifiers: *Housed confinement.

Although farm waste problems are in great need of research, livestock confinement provides numerous advantages: greater mechanization of chores, animal protection, and potentially increased production. Specific problems related to waste collection, treatment, transportation and disposal are listed in order of priority: odors, nutrient or chemical control or adjustment, treatment for reduction, land disposal, re-use, and system selection. Housed livestock research facilities at the Meat Animal Research Center are described and possible research suggestions are listed. (See also W74-00125) (Frantz-East Central)
W74-00139

OTHER RESEARCH NEEDS,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
W. E. Splinter.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 113-114, November 29-30, 1972.

Descriptors: *Farm wastes, Proteins, Runoff, *Feed lots, *Waste disposal, *Recycling, Confinement pens, Aquatic animals, Hogs, Cattle, Filters, Nebraska.
Identifiers: *Paunch manure, Horses.

Alternate methods of recycling cattle manure, the use of grass as a runoff filter, and the treatment and disposal of swine, horse and aquatic wastes should further be explored. (See also W74-00125) (Frantz-East Central)
W74-00140

REGIONAL ADMINISTRATOR'S SUMMARY,
Agricultural Research Service, Peoria, Ill. North Central Region.
T. B. Kinney, Jr.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 117-119, November 29-30, 1972.

Descriptors: *Farm wastes, *Research priorities, *Coordination, *State governments, *Federal government, *Local governments, Administration, Waste treatment.

The regional administrator encourages research efficiency by increased cooperation among state, federal and industrial groups. Research priorities must be justly established and sound research must be carried out on high priority problems. (See also W74-00125) (Frantz-East Central)
W74-00141

AREA DIRECTOR'S SUMMARY,
Agricultural Research Service, Clay Center, Nebr. Meat Animal Research Center.
K. E. Gregory.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 125-126, November 29-30, 1972.

Descriptors: *Farm wastes, *Management, *Feed lots, *Research priorities, Expenditures, Costs.

High priority problems call for specific research approaches. Shortage of funds necessitates consolidation of some programs and reduction of others. Resources should be budgeted for efficient research at all locations. (See also W74-00125) (Frantz-East Central)
W74-00143

CONCLUDING COMMENTS,
Nebraska Univ., Lincoln. Agricultural Experiment Station.
H. W. Ottoson.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 127-129, November 29-30, 1972.

Descriptors: *Farm wastes, Crop production, *Livestock, Soils, Marketing, *Waste disposal, Odor, *Feed lots, Confinement pens, Nebraska, *Waste treatment.

The livestock waste management conference was a success. The conference was a bench mark inventory on which research in livestock waste mangement may be planned in the future. (See also W74-00125) (Frantz-East Central)
W74-00144

RELIABILITY OF URBAN WATER QUALITY MANAGEMENT,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
C. S. Shich, J. K. Garner, and G. L. Curry.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 27 p, 8 fig, 5 tab, 17 ref.

Descriptors: *Water quality, *Management, *Reliability, Water pollution control, Treatment facilities, *Optimization, Regions, Operating costs, Probability, Decision making, Economics, Mathematical models, Systems analysis, *Texas.
Identifiers: *Urban water, *Cost minimization, Chance-constrained quadratic programming, *Parametric analysis, *San Antonio River Basin (Tex), Managerial goals, Sensitivity analysis.

In the reduction of the liability of pollution to urban water resources, the probabilistic nature of the performance of pollution control facilities and environmental responses must not be ignored. Reliability is defined as the measure of effectiveness for the attainment of water quality managerial goals. An optimization model is developed for the determination of the best pollution control policies for each treatment facility in terms of the minimization of total regional cost requirements, the quality control requirements, and the reliability desired. A chance-constrained quadratic programming technique coupled with parametric analysis is utilized as the basic solution approach. A practical problem based on the situation existing in the San Antonio River Basin Region of Texas has been used to illustrate application of the technique. The implications resulting from a sensitivity analysis of this model are discussed. (Bell-Cornell)
W74-00180

NEED FOR METROPOLITAN WATER BALANCE INVENTORIES,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Program.
For primary bibliographic entry see Field 06A.
W74-00187

HYGIENIC EFFICACY OF SANITARY PROTECTION MEASURES FOR SURFACE WATERS IN THE REGION OF OIL-REFINING AND OIL-CHEMICAL ENTERPRISES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny i Profzabolevanii, Ufa (USSR).
For primary bibliographic entry see Field 05B.
W74-00241

SURVEY OF POTENTIAL VECTORS OF YELLOW FEVER IN TANZANIA, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Bondy (France). Services Scientifiques Centraux.
J. Mouchet.
Bull W H O. Vol 46, No 5, p 675-684. 1972. Illus. (English summary).
Identifiers: *Aedes control, DDT, Dieldrin, Organic compounds, Phosphorus, Survey, *Tanzania, *Vectors (Yellow fever).

A survey was made in Nov.-Dec., 1969, in the central and western parts of Tanzania. This is the start of the rainy season, although rains had not begun in most of the woodland steppe areas. Towns and villages (41) in the woodland steppe, woodland savanna, Lake Victoria shores, highlands and intermediate regions were surveyed. The density of Aedes aegypti was evaluated in terms of the house index, the container index and the Breteau index; there is no standard index for Ae. simpsoni. No breeding of Ae. aegypti in drinking water was observed. It was found breeding mainly in outside containers and tree-holes; its seasonal fluctuation follows the rainfall pattern. Thus, the negative results recorded in the woodland steppe where the rains had not begun cannot be considered definite proof of the absence of this mosquito. The indices of density were generally low, they varied greatly from place to place, even in similar ecological conditions. The only color form of Ae. aegypti found was the black one (formosus). Larvae of Ae. simpsoni were plentiful in and near the villages. They were frequently as abundant as those of Ae. aegypti in their natural breeding sites. Thus, in the areas studied, Ae. simpsoni is a periodomestic and a feral species. The other potential vectors were seldom encountered; this is not surprising since the survey was biased toward towns and villages. Larvae of Ae. stokesi, Ae. schwetzi, Ae. marshalli and those of several species of Culex and Toxorhynchites brevipalpis were among the culicine larvae collected. Eight Tanzanian strains of Ae. aegypti were colonized in the laboratory and tested for susceptibility to various insecticides. Three strains (those from Tanga, Dar es Salaam, and the Pugu forest) were resistant to dieldrin; all of them were susceptible to DDT and organophosphorus compounds.--Copyright 1973, Biological Abstracts, Inc.
W74-00242

EFFECTS OF ARTIFICIAL DESTRATIFICATION ON ZOOPLANKTON IN PARVIN LAKE, COLORADO,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
For primary bibliographic entry see Field 05C.
W74-00243

ENZYMATIC REMOVAL OF OIL SLICKS,
Oklahoma State Univ., Stillwater. Dept of Biochemistry.
R. K. Gholson, and P. E. Guire.
Available from the National Technical Information Service as AD-757 071, $3.00 in paper copy, $1.45 in microfiche. Final Report, March 4, 1973. 14 p, 7 ref, append. Project No 137-876/6-3-70 (Code 443). Contract No N00014-71-A-0004-0001.

Descriptors: *Oil spills, *Enzymes, Toxicity, Daphnia, Oil pollution, Emulsifiers, Yeasts, Microbial degradation, Organic compounds.
Identifiers: *Oil removal, Cleanup, Candida petrophilum, Pseudomonas aeruginosa, Hexadecane.

A procedure to modify enzymes chemically in order to cause them to adhere to a hydrocarbon-water interface without appreciable loss of enzymatic activity has been developed. So far this procedure has only been applied to 'model' enzymes (muramidase, ribonuclease and 2 lipases); however, it is hoped that it can also be successfully used with purified microbial hydrocarbon oxidizing enzymes when they become available. Partial purification and characterization of extracellular emulsifying factors, produced by microorganisms (Candida petrophilum and Pseudomonas aeruginosa) during their growth on hydrocarbons was also accomplished. These factors are potentially useful in clean up of oil spills by providing an easily biodegradable non-toxic detergent. Preliminary toxicity tests with the water flea (Daphnia magna) have indicated an LD sub 50 concentration after 48 hours exposure, of 40 percent for the yeast culture supernatant and 8 percent for the Pseudomonas culture supernatant. (Little-Battelle)
W74-00284

CAPITAL AND OPERATING COSTS OF POLLUTION CONTROL EQUIPMENT MODULES, VOLUME I, USER GUIDE,
ICARUS Corp., Silver Spring, Md.
H. G. Blecker, and T. W. Cadman.
Copy available from GPO Sup Doc as EP1.23/3:73-023a, $2.40; microfiche from NTIS as PB-224 535, $1.45. Environmental Protection Agency, Socioeconomic Studies Series, Report, EPA-R5-73-023a, July 1973. 255 p, 4 fig, 51 tab, 4 ref. EPA Project 21AQJ. 68-01-0717.

Descriptors: *Cost analysis, *Costs, *Pollution abatement, Cost comparisons, Economics, Annual costs, Construction costs, *Operating costs, Estimated costs, Manuals, *Engineers estimates, *Capital costs, Water pollution control.

The User's Guide describes the scope of the cost manual on installation and operation of pollution control equipment modules. Illustrative examples are given enabling the user to prepare estimates of conceptual environmental protection processes using the companion Data Manual. Emphasis is placed upon the determination of the installed and annual costs of individual process equipment modules, determination of the installed and annual process costs, and evaluation of the portential process profitability in those cases where profit is a motive. (See also W74-00308) (Abel-EPA)
W74-00307

CAPITAL AND OPERATING COSTS OF POLLUTION CONTROL EQUIPMENT MODULES, VOLUME II, DATA MANUAL,
ICARUS Corp., Silver Spring, Md.
H. G. Blecker, and T. W. Cadman.
Copy available from GPO Sup Doc as EP1.23/3:73-023b, $1.90; microfiche from NTIS as PB-224 536, $1.45. Environmental Protection Agency, Socioeconomic Studies Series, Report, EPA-R5-73-023b, July 1973. 183 p, 10 ref. EPA Project 21AQJ. 68-01-0717.

Descriptors: *Cost analysis, *Costs, *Pollution abatement, Cost comparisons, Economics, Annual costs, Construction costs, *Operating costs, Estimated costs, Manuals, *Engineers estimates, *Data collections, *Capital costs.

This Data Manual presents, in convenient graphical and tabular form, cost information for installed equipment item modules on separate data sheets. Each data sheet conforms to a uniform style providing information on the specific item and adjustments to a typical installation, construction, or design. The methodology used in developing this data and the techniques suggested for its use are described in detail in the companion User Guide. (See also W74-00307) (EPA)
W74-00308

HYDROGEOLOGICAL BASIS FOR PROTECTION OF GROUNDWATER AND WATER WELLS FROM POLLUTANTS (GIDROGEOLOGICHESKOYE OBOSNOVANIYE ZASHCHITY PODZEMNYKH VOD I VODOZABOROV OT ZAGRYAZNENIY),
For primary bibliographic entry see Field 05B.
W74-00347

THE POLITICS OF WATER POLLUTION,
Connecticut Univ., Storrs. Inst. of Water Resources.
D. M. Fox.
Completion Report, 1973, 15 p. OWRR A-046-CONN (1). OWRR 14-31-0001-3507.

Descriptors: *Political aspects, *Water pollution control, *Decision making, Water policy, Pollution abatement, Federal Government, State Governments, *Connecticut, Agriculture, Industries, Legal aspects, State jurisdiction, Legislation.
Identifiers: Interest groups, Federal grants, Questionnaires, Connecticut Water Resources Commission, Connecticut Clean Waters Act of 1967.

A majority of the commissioners on the Water Resources Commission (WRC) of Connecticut, in existence from 1957 to 1971, represented, directly or indirectly, interests which pollute, including agriculture, municipal government, and industry. These commissioners, rather than representatives of ecological groups, dominated WRC decisions. Case studies of two polluters - the City of New Haven and the Scovill Corporation of Waterbury, lead to the following conclusions: (1) efforts to end pollution have been delayed by the slowness of the WRC in reviewing abatement plans, (2) the failure of the Federal government to fund pollution abate-

ment grants at levels originally promised have slowed down or stopped abatement. A great deal has been done under the 1967 Connecticut Clean Waters Act to reduce pollution. However, the composition of the WRC, the failure of the state government to fund WRC at levels permitting hiring of additional staff, and the failure of the federal government to fund its contribution at levels originally expected have prevented the full attainment of the goals set forth in the act.
W74-00391

AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS,
Kentucky Univ., Lexington. Coll. of Agriculture.
A. F. Bordeaux, Jr.
In: Quality of the Environment, Socio-Economic, Biological and Engineering Aspects, papers presented at the College of Agriculture Annual Conference, University of Kentucky, January 5-7, 1971. p 1-7 (1971), 6 ref.

Descriptors: *Water pollution, Economics, Surface waters, Technology, *Fertilizers, Conservation, Insecticides, *Farm wastes, Nitrates, Farm prices, Costs, *Waste disposal, Water treatment, DDT, Regulation, Kentucky, Agriculture.

As the interest in environmental protection heightens in the United States, farmers are increasingly criticized as pollutors of air and water. Costs of pollution must be met and farmers, declining in political power, feel the most pressure. Alternative chemicals are available to replace the DDT family, but they are less effective and more expensive. Providing for economical environmental protection requires the cooperative efforts of economists, engineers and scientists. (Frnatz-East Central)
W74-00395

DRAIN INSTALLATION FOR NITRATE REDUCTION,
Southwestern Irrigation Field Station, Brawley.
L. S. Willardson, B. D. Meek, L. E. Grass, G. L. Dickey, and J. W. Bailey.
Paper No. 69-734 presented at the 1969 Winter Meeting American Society of Agricultural Engineers, Chicago, Illinois, December 9-12, 1969. 2 tab, 2 fig.

Descriptors: *California, *Drains, *Installation, *Nitrates, Permeability, Sumps, Irrigation, Electrical conductance, Leaching, Percolation, Groundwater, *Dentrification.
Identifiers: *San Joaquin Valley (Calif), Panoche silty clay.

Because farmers remove more nitrates from the soil than they put into it, denitrification or reducing nitrates to nitrogen gas, is sometimes desirable. A field experiment was installed in California's San Joaquin Valley to test submergence of drains as a means of denitrification. The Panoche silty clay area was irrigated four times during the months of July and August. Samples made of the soil showed that the side of the drain oriented toward the ground water source had the highest reading of nitrate content. This indicated that soil denitrification depends ultimately upon saturation from irrigation as well as sufficient presence of organic carbon matter and a shortage of oxygen. Along with soil denitrification, ground water with high nitrate content was also diluted. (Frantz-East Central)
W74-00398

UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP,
Virginia Polytechnic Inst., Blacksburg. Dept. of Biochemistry and Nutrition; and Virginia Polytechnic Inst., Blacksburg. Dept. of Animal Science.
A. N. Bhattacharya, and J. P. Fontenot.
Journal of Animal Science, Vol 24, p 1174-1178, 1965. 4 tab, 28 ref.

Descriptors: *Sheep, *Nitrogen, Fertilizers, *Protein, Feeds, *Farm wastes, Nutrition, Chemical properties, Samples, *Metabolism, *Recycling.
Identifiers: Digestibility, Nitrogen retention, *Poultry litter, Peanut hulls, Crude protein, Soybean protein.

A series of three metabolism trials were conducted with eight yearling wethers to study the utilization of the nitrogen in auto-claved peanut-hull broiler litter, containing 22.6% crude protein (dry basis). Poultry litter nitrogen replaced approximately 25, 50 and 100% of the nitrogen of a purified ration containing isolated soybean protein as the nitrogen source. Apparent digestibility of crude protein in the rations decreased significantly with each increase in litter nitrogen level above 25%. However, the depression was small when litter supplied 50% of the nitrogen. When litter supplied 25 and 50% of the nitrogen, digestibility of litter crude protein calculated by difference was 67 and 65%, respectively, compared with 71% when only soybean protein was used. Nitrogen retention, expressed as grams per day, percent of nitrogen intake or percent of absorbed nitrogen, was significantly lower at the 100% litter nitrogen level than when no litter was used. There were no consistent differences in ammonia and non protein nitrogen content of rumen fluid and in concentration of various nitrogen fractions in the blood plasma of sheep fed the different rations. (East Central)
W74-00401

DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP,
Agricultural Research Service, Beltsville, Md. Biological Waste Management Lab.
L. W. Smith, C. C. Calvert, and J. R. Menear.
In: Proceedings 1973 Maryland Nutrition Conference for Feed Manufacturers, The University of Maryland, The Maryland Feed Industry Incorporated, and The American Feed Manufacturers Association cooperating, March 15-16, 1973. p 35-44, (1973), 1 fig, 15 tab, 14 ref.

Descriptors: *Farm wastes, *Arsenic, *Sheep, *Nitrogen, *Feeds, Growth, Nutrition, Chemical properties, *Recycling.
Identifiers: Poultry manure supplemented diets, Feed additives, Digestibility, Soybean oil meal.

Despite possible arsenical residues, dehydrated poultry-manure (DPM) supplemented diets were consued by sheep as readily as diets supplemented with soybean oil meal (SBOM). Nitrogen from broiler manure supplemented diets was not significantly less digestible than SBOM nitrogen and was retained in the sheep equally well. The true digestibility of DPM-N was determined to be 81%, a value of similar magnitude determined by others for drymixed conventional feeds. Arsenic from different sources ingested by sheep was detected in all tissues assayed. Withdrawal of arsenic from feed results in a rapid decrease in tissue arsenic concentration. Significance of arsenic in poultry manure processed for ruminant crude protein supplements will depend on individual feeding regimes, arsenic concentration in manure and permissible levels established for lamb and mutton. (East Central)
W74-00413

EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE,
Agricultural Research Service, Beltsville, Md. Animal Science Research.
R. W. Miller, L. G. Pickens, and C. H. Gordon.
Journal of Economic Entomology, Vol 24, No 4, p 902-903, August 1971. 2 tab, 11 ref.

Descriptors: *Cattle, *Farm wastes, Larvae, *Mortality, Additives, Feeds, Poultry.
Identifiers: *Fly control, *Bacillus thuringiensis Berliner, *Musca domestica L., Biotrol BTB-183.

A commercial formulation of Bacillus thuringiensis Berliner, Biotrol BTB 183-25 W, was fed to dairy cattle in an attempt to control house fly, Musca domestica L., larvae in the feces. A maximum larval mortality of 32% was obtained when cows were fed 3200 ppm of this formulation. In an in vitro experiment, complete control of house fly larvae was obtained at a level of 12,800 ppm of feces. (East Central)
W74-00414

THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE,
Nebraska State Dept. of Environmental Control, Lincoln. Solid Waste Div.
For primary bibliographic entry see Field 05B.
W74-00420

MANURING OF POTATOES ON FEN SILT SOILS IN HOLLAND, LINCOLNSHIRE,
Agricultural Development and Advisory Service, Cambridge (England).
For primary bibliographic entry see Field 03F.
W74-00422

TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE,
Agricultural Research Service, Kerrville, Tex. Entomology Research Div.
R. O. Drummond.
Journal of Economic Entomology, Vol 56, No 3, p 344-347, June, 1963. 2 tab, 6 ref.

Descriptors: *Toxicity, *Farm wastes, Feed lots, Larvae, *Insecticides.
Identifiers: *House flies (Musca domestica), *Horn flies (Hacmatobia irritans), Bayer 22408, Co-ral, Butonate, Bayer 37342, Famophos, Bayer 37341, Rhodia RP-9895, Dipterex, V-C 13, General Chemical 4072, Bayer 29493, Stauffer R-1504, Chlorinated hydrocarbons.

Insecticides were added to cattle rations in long and short term experiments. In a 91-day test Co-ral and Bayer 22408 proved 100% effective in preventing development of larvae of horn flies and partially effective against house flies in the manure tested. Ten insecticides were used in 10-day tests. Some insecticides were effective against both species, while others were at least partially effective with either or both. (Frantz-East Central)
W74-00423

AGRICULTURE AND ENVIRONMENT,
For primary bibliographic entry see Field 05B.
W74-00427

FROM RESORT AREA TO URBAN RECREATION CENTER: THEMES IN THE DEVELOPMENT OF LAKE TAHOE 1946-1956,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 06B.
W74-00441

WATERSHED PROGRAM LACKS ECOLOGICAL DIMENSIONS,
For primary bibliographic entry see Field 06G.
W74-00442

WISCONSIN'S SHORELAND PROTECTION PROGRAM: A STATE-LOCAL REGULATORY APPROACH TO NATURAL RESOURCE PRESERVATION,
For primary bibliographic entry see Field 06E.
W74-00447

SOLID WASTE MANAGEMENT.
Metropolitan Council of the Twin Cities Area, Minn.

March, 1970. 24 p, 2 fig.

Descriptors: *Solid wastes, *Water pollution, *Landfills, Planning, Waste disposal, Environmental effects, Water table, Groundwater, *Minnesota.
Identifiers: Policies, Solid waste management, *St. Paul (Minn.), *Minneapolis (Minn.).

This policy plan for solid waste management, one of several interrelated elements of a total development guide for the Twin City metropolitan area, contains three parts: a presentation and discussion of long range policies for solid waste management; a 10 year plan for disposal of solid wastes with emphasis on sanitary landfills; and a short range implementation program. The long range policies cover such issues as disposal methods, the location and accessibility of landfill sites, environmental pollution and relations to water resources, compatibility of disposal sites with adjacent land uses, and the ultimate use of the disposal site for other purposes. With regard to relations to environmental quality and water resources in particular, sanitary landfills are prohibited within 1,000 feet of the normal highwater mark of a lake, pond, or reservoir and within 300 feet of a river or stream; they are prohibited in major groundwater recharge areas and wetlands, and putrescible wastes cannot be deposited within five feet above the highest known level of the water table at a landfill site. (Elfers-North Carolina).
W74-00449

METROPOLITAN COUNCIL FIVE-YEAR CAPITAL IMPROVEMENT PROGRAM FOR SEWERAGE FACILITIES.
Metropolitan Council of the Twin Cities Areas, Minn.

September, 2972. 20 p, 2 tab.

Descriptors: *Sewerage, *Project planning, *Budgeting, *Minnesota, Programs, Projects, Priorities, Financing, Water quality control.
Identifiers: Capital improvements, Public participation, *St. Paul (Minn.), *Minneapolis (Minn.).

This program amends the 1970 Metropolitan Development Guide for sanitary sewers and includes numerous major projects for the collection, treatment, and disposal of wastewater for the period 1972 through 1976, a capital improvements budget for 1972-73, and various new policies and criteria. The program was formulated via well-defined procedures adopted by the Metropolitan Council to assure strong input from local governments and interested citizens. The procedures include public hearings, solicitation of written comments, and public meetings in each of the local sewer service areas. Some of the policies adopted include the new construction of only those projects for which maximum federal and state support is available and the expansion of sewerage capacity only where there is a strong local commitment, unless there are serious metropolitan-wide issues at stake. New criteria for ranking proposed projects were also adopted. Highest priority projects are those to serve areas subject to immediate health hazards, areas where serious pollution is taking place, and areas planned for major urban development within the next five years. (Elfers-North Carolina)
W74-00450

SEWAGE AND WASTE CONTROL RULES AND REGULATIONS FOR THE METROPOLITAN DISPOSAL SYSTEM.
Metropolitan Sewer Board, St. Paul, Minn.

December, 1971. 13 p.

Descriptors: *Sewerage, *Regulation, *Waste water disposal, *Waste water treatment, Waste identification, Inspection, Monitoring, Permits, Penalties, Standards, Septic tanks, Administration, *Minnesota.
Identifiers: *St. Paul (Minn.), *Minneapolis (Minn.).

Rules and regulations have been adopted to provide an efficient and safe operation of the metropolitan wastewater disposal system and to help carry out the comprehensive sanitary sewer plan. The key areas covered by the regulations are new connections to the sewerage system, the nature of allowable discharges into the system, the disposal of septic tank sludge, and the enforcement of the regulations. No connections are allowed to the system without a permit and an inspection. Of particular importance is the determination of the source, quantity, and characteristics of the wastewater load. No connections are allowed to discharge contents from septic tank. Other wastes that are either prohibited or restricted include fats, wax, oils, garbage that has not been ground, radioactive wastes, and any materials that are either highly flammable or noxious. Industrial waste discharges are allowed but the industry must provide access to monitor the nature of the wastes. In addition, if the wastes are high in suspended solids or chemical oxygen demand a surcharge will be levied. (Elfers-North Carolina)
W74-00452

COMPREHENSIVE PLAN FOR BATON ROUGE.
Baton Rouge City-Parish Planning Commission, La.
For primary bibliographic entry see Field 03D.
W74-00453

CENTRAL FRESNO COUNTY WATER AND LIQUID WASTE PROGRAM: VOLUME I--FINDINGS, CONCLUSIONS, RECOMMENDATIONS.
Grunwald, Crawford and Associates, Inc., Fresno, Calif; and Engineering-Science, Inc., Fresno, Calif.
For primary bibliographic entry see Field 03D.
W74-00457

PUBLIC HEALTH CONSEQUENCES OF MASS SWARMING OF BOOPHTHORA ERTHROCEPHALA (DE GEER, 1776) BLACK FLIES IN COUNTY SZOLNOK DURING FLOODS OF 1970,
Szolnok Megyei Kozegeszsegugyi Jarvanyugi Allomas (Hungary).
D. Papay, J. B. Szabo, and I. Tarjanyi.
Parasitol Hung. 4 p 181-188. 1971. (English summary).
Identifiers: Boophthora-Erythrocephala, *Flies (Black), Floods, Human diseases, *Hungary (County Szolnok), Nuvan, *Public health, Swarming, Chemtrol.

The black fly swarm in County Szolnok, Hungary in 1970 caused economic damage, with estimated losses approaching 1.0-1.5 million forints. These black flies, Boophthora erythrocephala, bred in large rivers and streams in Hungary. A total of 2600 persons received treatment for fly bites: of these 240 went on sick pay for a total of 1200 days. The illness lasted 5 days, but especially sensitive or seriously bitten people were sick for as long as 10 days. Chemical control of the flies was attempted by application of Nuvan 100 SC with a Tifa-system warm-fog generator. The complaints were finally eliminated overnight by the fall of the River Tisza and a period of hot weather.--Copyright 1973, Biological Abstracts, Inc.
W74-00477

CIESM AND MARINE POLLUTION,
Office of Naval Research, London (England).
For primary bibliographic entry see Field 05B.
W74-00543

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

METHODOLOGY FOR ASSESSING THE POTENTIAL IMPACT OF URBAN DEVELOPMENT ON URBAN RUNOFF AND THE RELATIVE EFFICIENCY OF RUNOFF CONTROL ALTERNATIVES,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 02A.
W74-00001

SYSTEMS ANALYSIS MADE EASY FOR WATER RESOURCES PLANNERS,
Montana State Univ., Bozeman. Dept. of Civil Engineering.
G. V. V. Rao, and T. T. Williams.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 36 p, 2 fig, 2 tab, 35 ref.

Descriptors: *Water resources, *Planning, *Operations research, *Linear programming, Optimization, Dynamic programming, Simulation analysis, Equations, Computer programs, Constraints, Reservoir operation, Model studies.

With technology enabling the impounding, lifting and transporting of water for so many uses, water resources planning is a highly complex task. Modern techniques of operations research can be gainfully used in solving such complicated problems. Techniques of operations research, particularly linear programming, are introduced, using examples taken from various water resource settings. Considered also are dynamic programming and simulation analysis. No previous knowledge of systems analysis is required. (Bell-Cornell)
W74-00167

FLOOD CONTROL MODEL FOR MULTI-RESERVOIR SYSTEMS,
Natal Univ., Durban (South Africa). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W74-00168

ESTIMATING REGIONAL WASTEWATER TREATMENT COSTS,
Wisconsin Dept. of Natural Resources, Madison. Water Resources Planning Section.
For primary bibliographic entry see Field 05D.
W74-00169

THE DEVELOPMENT OF METHODS FOR THE PLANNING OF UTILISATION AND PROTECTION OF YUGOSLAV WATER RESOURCES.
B. Djordjevic.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 34 p, 2 fig, 9 ref.

Descriptors: *Water resources development, *Planning, *Protection, *Basins, *Optimization, *Multiple-purpose projects, Methodology, Hydrologic aspects, Legal aspects, Dynamic programming, Simulation analysis, Monte Carlo method, Equations, Mathematical models, Systems analysis.
Identifiers: *Yugoslavia, Organizational aspects.

A general survey is presented of problems arising in planning the utilization and protection of water

resources on a national scale and within individual basins. A brief illustration of the Yugoslav hydrological situation and the main water resource development problems is presented. Also given are the legal and organizational aspects of the complete system is described. The theory of the water resources development system is described through modern methods entailing a matrix with three vectors defining locations, quantities and quality of water resources. Special attention is paid to the problem of choosing criteria in solving optimization problems of complex systems, particularly treatment developmental, systematic-technical aspects of criterion selection. Cited are Monte Carlo-type methods used to simulate hydrological series in water resource development planning. The overall idea in the optimization of a complex, multiple-purpose system with the application of dynamic programming is illustrated, and experience collected to date in the solution of optimization problems in water resources development is summarized. (Bell-Cornell)
W74-00170

SCHEDULING AND SEQUENCING IN WATER RESOURCE INVESTMENT MODELS,
Cuyo Univ., Mendoza (Argentina). Escuela de Economica.
T. B. Facet, and D. H. Marks.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 35 p, 9 fig, 8 ref.

Descriptors: Water resources development, *River basins, *Investment, *Mathematical models, *Scheduling, *Linear programming, *Alternative planning, Optimization, Simulation analysis, Hydroelectric power, Irrigation, Systems analysis, Project planning constraints.
Identifiers: Integer programming, *Sequencing.

Two methodologies are suggested for water resources investment planning, involving the use of optimization and simulation. Two optimization models are constructed: A scheduling linear programming and a sequencing integer programming model; both are utilized to obtain a preliminary selection of sites and operating strategies for development of a river basin. The objective is economic efficiency: given the planning objectives, available streamflows, and budget and population, what needs to be considered, and when, in order to maximize net revenues from the proposed projects. The linear programming model screens the whole range of development alternatives over time for a river basin; it is deterministic in that hydrologic inputs are taken as mean values and as being certain to occur, but since the model covers a certain time period, it is possible to investigate the sensitivity of the solution to different traces of inflows. The water uses considered are hydroelectric energy production and irrigation. The sequencing integer programming model is a type of capital budget model. It requires a set of possible projects to be built with specified sizes over the planning horizon. The problem is in what sequence to construct the selected projects. (Bell-Cornell)
W74-00172

WATER RESOURCE DEVELOPMENT PROBLEMS IN A RURAL AREA IN TRANSITION,
Montana State Univ., Bozeman. Dept. of Agricultural Economics.
C. Hash, and H. Holje.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 43 p, 1 tab.

Descriptors: Water resources development, *Rural areas, *Land development, *Montana, *Linear programming, *Economic impact, Research, Estimating, Evaluation, Recreation, Irrigation water, Water distribution, Benefits, Agriculture, Systems analysis.
Identifiers: *Bitterroot Valley (Montana), *Multivariate regression analysis, Policy change, Residential use.

The rapid transition of land and water resources from agricultural to recreation-residential use in Montana's mountain valleys presents: opportunities for increased return to the resources of the area, and problems of possible local tax increases and other typical kinds of urban problems. Basic research findings of the Montana University Joint Water Resources Research Center are described. A multivariate regression model was used to analyze data on sales of unimproved tracts of land in the Bitterroot Valley area to determine the contribution to the value of various amenities and detriments. A linear programming model of the resource economy of the Valley was used to evaluate the impact on local community well-being of certain policies to internalize some of the external costs of recreation-residential development. It was estimated that an annual benefit of approximately $63,000 could be realized by forcing developers and recreation-residential occupiers to consider and react to such externalities as the costs of: road maintenance, school transportation, and incompatible uses on adjacent lands. The linear programming model was used also to estimate the impact on the agricultural economy of improvements in the irrigation water distribution system. (Bell-Cornell)
W74-00173

DEVELOPMENT AND APPLICATION OF LARGE-SCALE WATER AND LAND ALLOCATION MODELS FOR THE UNITED STATES.
Iowa State Univ., Ames.
E. O. Heady.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 42 p, 8 fig, 2 tab, 10 ref.

Descriptors: *United States, *Water allocation (Policy), *Water supply, *Mathematical models, *Regional analysis, *Water users, Spatial distribution, Land use, Resource allocation, Prices, Crops, Value, Economics, Comprehensive planning, Human population, Evaluation, Equations, Systems analysis.

The development and application of large-scale water and land allocation models for the United States are summarized, and the basic mathematical programming model is presented in detail. This model considers the location of all population and economic activity in the future, water supplies in all water supply areas, all individual farm producing areas, all crops and livestock products of the U. S., and all consumer markets. It considers land restraints in each of 223 farm producing regions, water and irrigable land supplies (restraints) in each of 51 water supply regions, and a set of demand equations for food commodities in each of 50 spatially-defined consumer markets. This model determines: (1) an optimal spatial allocation of water between agriculture, industrial, and metropolitan uses, among many producing regions and among alternative potential water development projects; (2) supply price and value of water; (3) conditions under which capital technology should be developed for land used under rainfed conditions, and substituted for water at other locations. The model selects optimum combinations of irrigated and dryland crops under alternative technologies for each. This model, and many of those based upon it, are the largest, most detailed and operationally useful water planning models applied in any country in the world. (Bell-Cornell)
W74-00174

MATHEMATICAL MODELLING OF CAPACITY EXPANSION OF AN INTEGRATED HYDRO--THERMAL ELECTRICAL POWER SYSTEM,
Secretaria de Recursos Hydraulicos, Mexico City.
C. D. D. Howard.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 6 p, 1 fig.

Descriptors: *Planning, *Hydroelectric power, *Simulation analysis, *Mathematical models, Digital computers, Operating costs, Streamflow, Optimization, United States, Probability, Systems analysis, Thermal power.
Identifiers: *Capacity expansion, Power demand, Manitoba (Canada).

A study to define development strategy consistent with the long-range capacity expansion required to meet an increasing power demand in Manitoba and a developing export market in the U. S. is described. The expansion problem was studied for several years by the System Planning Division of Manitoba Hydro, with the aid of a digital computer program allowing for simulation of most of the features of a possible ultimate system. The program simulated the operation of a power system at each stage of its development using historical streamflow sequences; results provided information about the probability of satisfying future power demands with the trail system configuration and the expected cost of operating the trial development plan over a 20-year period. Considering the complexity of selecting the optimal sequence of development of some 35 power stations, as well as of two major river diversions and two reservoir developments (all very large), and due to a five-month time constraint, it was deemed impractical to develop new, unproven mathematical techniques. Linear and non-linear programming did not appear as promising techniques here. Hence, a combination of a simplified mathematical model, Manitoba Hydro's detailed simulation program, and engineering judgment were utilized to approximate what an optimal system would look like. Particularly, the time and level of the next development stage were considered. (Bell-Cornell)
W74-00175

ROLE OF DIGITAL COMPUTER MODELS OF AQUIFERS IN WATER RESOURCES PLANNING: CASE STUDY IN TUCSON, ARIZONA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 04B.
W74-00176

JOINT USE OF SCREENING AND SIMULATION MODELS IN MULTIOBJECTIVE PLAN FORMULATION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06B.
W74-00177

EXPECTED OPTIMUM RECORD LENGTH AS A BASIS FOR HYDROLOGIC NETWORK DESIGN,
Geological Survey Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 07C.
W74-00178

OPTIMAL ALLOCATION OF LIMITED WATER RESOURCES,
Water Resources Engineers, Inc., Walnut Creek, Calif.
G. T. Orlob, I. P. King, D. E. Evenson, and G. K. Young.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 33 p, 9 fig, 1 tab, 4 ref.

Descriptors: *Water allocation (Policy), *Computer programs, *Optimization, *Planning, *Water transfer, Texas, Simulation analysis, Water

supply, Water demand, Inter-basin transfers, Decision making, Methodology, Evaluation, Systems analysis, Mathematical models.
Identifiers: *Cost minimization, *Texas water plan, *Poland (Vistula River System).

Some computerized techniques are described which have been designed specifically for water resource planners in determining the economically optimum program for stage development of large-scale water transfer schemes. Particular attention is paid to multi-component systems involving interbasin transfers from areas of surplus to locations of intensive demand. The Trans-Texas Division of the Texas Water Plan and the Vistual River System (Poland) are used as case studies to demonstrate application of the new methodology. The Texas study planning package: (1) determines reservoir operating rules using the Out-of-Kilter Algorithm; (2) uses a random search technique to select schedules and a method of successive perturbations to improve schedules and reduce costs; (3) uses a simulation-optimization model based on the OKA for a secondary screening of the development plans; and (4) final-screens the development plans to determine minimum-cost feasible solutions and optimal operating criteria. An extension of the OKA and a 'One-Step Method' that allows evaluation of alternative system configurations under optimal operating conditions were used in the Vistula River study; the general approach and the problems encountered are outlined. Potentials for future application of simulation-optimization techniques in planning for the allocation of limited water resources are discussed. (Bell-Cornell)
W74-00179

RELIABILITY OF URBAN WATER QUALITY MANAGEMENT,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05G.
W74-00180

STATE WATER RESOURCE PLANNING IN ARID ARIZONA,
For primary bibliographic entry see Field 06B.
W74-00181

RESERVOIR OPERATION FOR RECREATION USABILITY,
Toronto Univ. (Ontario). Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 04A.
W74-00185

AGRICULTURAL WATER ALLOCATION, LAND USE, AND POLICY,
Iowa State Univ., Ames. Center for Agricultural and Rural Development.
For primary bibliographic entry see Field 03F.
W74-00186

NEED FOR METROPOLITAN WATER BALANCE INVENTORIES,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Program.
M. B. McPherson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY10, Proceedings paper No 10078, p 1837-1848, October 1973. 4 fig, 28 ref.

Descriptors: *Water balance, *Systems analysis, *Municipal water, *Comprehensive planning, Water resources, *Management, *International commissions, *Water pollution, Engineering, Hydrology, Automation.
Identifiers: *Inventories, *Urban development, Water budget, Metropolitan areas.

The term 'water balance inventory' is used to describe the determination of the quantity and quality aspects of the fate of water as it cycles through a metropolitan area. More of these inventories are needed for evaluation of the hydrological effects of urbanization and related development of strategies for resource management and environmental protection. A general accounting for the overall movement of water and pollutants can be ascertained by comparing such complete inventories over successive time intervals. The status of metropolitan comprehensive water resource systems analysis is outlined, system complexities are described, and the need for inventories is explained. (An inventory requires definition of the interrelationships between numerous processes and events, and this coincides with requirements for the initial stage of a comprehensive systems analysis of the water resources of a metropolitan area). Progress is being made in a few notable instances, but in most cases serious obstacles have impeded advances; investments in such research, world-wide, are well below levels that could be justified by the economic and environmental importance of urban water resources. (Bell-Cornell)
W74-00187

OPTIMIZATION OF MULTIPLE RESERVOIR SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 04A.
W74-00188

APPLICATIONS OF LINEAR INTEGER PROGRAMMING TO PROBLEMS OF LAND USE ALLOCATION,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 04A.
W74-00503

6B. Evaluation Process

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCES SYSTEMS, VOL. VI ESTIMATING ECONOMIES OF SCALE IN THERMAL ELECTRIC POWER SYSTEMS SUBJECTED TO ENVIRONMENTAL QUALITY CONSTRAINTS,
Cornell Univ., Ithaca, N.Y.
C. R. Scherer, and D. P. Loucks.
Available from the National Technical Information Service as PB-224 500, $8.00 in paper copy, $1.45 in microfiche. Cornell University Water Resources and Marine Sciences Center, Ithaca, Technical Report No. 67, 1973. 376 p, 86 fig, 44 tab, 101 ref, 4 append. OWRR C-3101 (No 3684) (2).

Descriptors: Model studies, Optimization, *Linear programming, Electric power rates, Long-term planning, Methodology, *New York, *Cost analysis, *Electric power demands, Economic efficiency, *Economies of scale, Utilities, Environmental effects, Thermal pollution, *Water quality standards, Urbanization.

This study is concerned with the estimation of economies of scale in thermal-electric power systems subjected to water quality standards. The approach is engineering-economic. Mixed-integer programming is used to solve a mathematical model of a power system subject to constraints defining (1) the load duration curves of several demand centers located on a spatial grid or network, (2) endogenously determined reserves equal to the largest two generating units in the system, (3) nonlinear transmission losses, and (4) environmental quality and emission standards. The objective of the model is to minimize the sum of total capital and operating costs for generation, transmission and abatement of pollution emissions. Fixed charges and piecewise linear functions are used to define costs exhibiting increasing returns to scale. The model is applied to a major part of the New York State Electric and Gas Corporation system. The results show that: (1) a system dominated by coal-fired new steam plants manifests increasing long-run average total system costs, no matter what emission controls are imposed on its plants, (2) a system dominated by nuclear-fueled new steam plants would manifest decreasing average costs, no matter what emission controls are imposed, (3) when emissions are limited to 'near-zero', average total costs increase only very slowly with system peak output for coal-dominated systems, but decrease very rapidly for nuclear-dominated systems. The ratio of system capital cost to system total costs increases as permissible emissions are decreased.
W74-00002

GEORGIA'S WATER PROBLEMS AND RELATED RESEARCH NEEDS,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
G. E. Willeke, A. C. Benke, A. M. Lumb, B. H. Kornegay, and W. Neely.
Available from the National Technical Information Service as PB-224 433, $4.25 in paper copy, $1.45 in microfiche. Completion Report ERC-1173, August 1973. 100 p, 2 fig, 3 tab, 26 ref, 2 append. OWRR A-041-GA (1). 14-31-0001-3810.

Descriptors: *Research priorities, *Management, Local governments, *Research facilities, *Scientific personnel, *Georgia, Irrigation, Ecology, Channeling, *Planning, Hydrologic cycle, Pollution abatement, State governments, Education, Universities.

Water problems and research needs are discussed by region of the State. They are also discussed under the headings of water quantity, quality, ecology, planning and management, and agriculture. A survey of research capability in Georgia colleges is included. Technology transfer needs are addressed and related to research. Though a water-rich State, Georgia has a wide range of water problems, including floods, droughts, pollution, local water shortages, soil erosion, and conflicts over the use of land and water resources. The problems are shifting from predominantly rural to predominantly urban. Ecological studies throughout the State, groundwater studies in the Piedmont and Mountain regions, erosion reduction in areas undergoing urban development, drought studies, and a number of supplemental irrigation problems are among the research needs. Many of the research needs are in planning and management, particularly those dealing with land and water use conflicts. A large research capability exists in Georgia, both at the graduate education and research universities and at the two- and four-year college units of the University System of Georgia. Utilization of this capability is hampered by the lack of suitable organizational arrangements and of funds for working on problems that are primarily of interest within the State. A major deficiency in Georgia is the absence of a research tradition in water resources. A research board or council is recommended to foster such a tradition, to increase the rate at which needed research is done, and to help disseminate the results.
W74-00004

COASTAL PROCESSES AND LONG RANGE PLANNING,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02L.
W74-00034

REGIONAL PERSPECTIVES,
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 05G.

W74-00123

PROCEEDINGS: LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW.
For primary bibliographic entry see Field 05G.
W74-00125

REGIONAL ADMINISTRATOR'S SUMMARY,
Agricultural Research Service, Peoria, Ill. North Central Region.
H. M. Teeter.
In: Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p 121-124, November 29-30, 1972.

Descriptors: *Reviews, *Planning, Project planning, *Evaluation, Waste treatment, Farm wastes.
Identifiers: *Program Planning Review.

Researchers should be required to do fewer reviews and reports that could be done through the Program Planning Review. The Program Planning Review plans and evaluates research programs and assesses the quality and effectiveness of research. (See also W74-00125) (Frantz-East Central)
W74-00142

ENERGY CONSERVATION STRATEGIES,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
M. R. Seidel, S. E. Plotkin, and R. O. Reck.
Copy available from GPO Sup Doc as EP1.23/3:73-021, $1.25; microfiche from NTIS as PB-224 493, $1.45. EPA Socioeconomic Environmental Studies Series, Report EPA-R5-73-021, July 1973. 114 p, 10 fig, 20 tab. EPA Program Element 1H1093.

Descriptors: Energy, Demand, *Alternative costs, Evaluation, Economic efficiency, *Economic prediction, Pricing, Investment, *Cost analysis, *Estimated costs, Marketing, *Resource allocation, Natural resources, Alternative planning.
Identifiers: *Energency demand, *Price distortions, *Energy uses, Energy conservation.

Various strategies are examined for reducing national energy demand. Suppose government chooses to reduce national energy use, and to do so in a cost-effective way. Then it is necessary to determine, for each potential energy saving, how much energy is involved and how costly the alternatives would be. The study begins by asking how much is now paid, or might be paid in the future, by various energy users. Many users get much of their energy at relatively low prices, and are thus encourage to waste it; the economist calls this 'price distortion', a form of 'market failure'. The study analyzes the kinds of market failure which seem to cause the present 'energy crisis', the kinds of government action which could rectify these failures, and the likely response of the economy to moderate price increases. Numerous actions, some large and some small, would be required to restore a more efficient functioning of the market for energy. Some of these actions have already been initiated. In an efficient market, energy price increases of 25% would prompt a halving of the growth of energy demand; through 1990, energy needs would grow 40% rather than the 100% project at current prices. (EPA)
W74-00152

ASSESSING THE SOCIAL EFFECTS OF PUBLIC WORKS PROJECTS,
Army Board of Engineers for Rivers and Harbors, Fort Belvoir, Va.
E. J. Baur.
Resident Scholar Program Research Paper No 3, June 1973. 35 p, append.

Descriptors: *Social impact, *Planning, *Utilities, Forecasting, Indicators, Measurement, *Social participation, *Project planning, Project post-evaluation, *Evaluation.
Identifiers: Social effects, Social indicators.

Social effects of public works projects should be viewed as resultants of interaction between agency and the public. Since the role the agency takes in this process is an important determiner of the outcome, the analysis of social effects must take account of the agency's public participation program. To avoid overlooking possible social effects, a complete list of social phenomena is needed. A systematic outline based on theoretical and empirical sources for inventorying social effects is presented. The identification and selection of phenomena for analysis that may be affected by a specific project must depend on the discernment of competent social scientists who are able to establish rapport with the public. The limitations of quantitative measurement methods requires supplementation by qualitative analysis. Where existing data sources are inadequate, the agency will need to use sample surveys and community studies. When forecasting effects, distinctions should be made between the stages of planning, construction, and operation. A continuing research program is recommended for determining the actual social effects of completed projects, developing improved methods of social research, and disseminating the substantive and methodological results of studies.
W74-00163

COST-EFFECTIVENESS OF WATER RESOURCES SYSTEMS DESIGN IN DEVELOPING COUNTRIES: CASE OF THE LOWER MEKONG,
Arizona Univ. Tucson. Dept. of Hydrology and Water Resources.
K. Chaemsaithong, L. Duckstein, and C. Kisiel.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 23 p, 3 fig, 20 ref.

Descriptors: *Cost analysis, *Water resources development, *Design, *Methodology, *Optimum development plans, Alternative planning, Decision making, Cost-benefit analysis, Cost-benefit ratio, Systems analysis, Evaluation, Fixed costs.
Identifiers: *Cost-effectiveness, *Lower-Mekong Basin, Developing countries, Sensitivity analysis.

Cost-effectiveness is an extension of engineering economics, in which alternative plans are sought and compared. Herein, the cost-effectiveness approach is introduced for analysis and design of water resource systems. The approach is used to study various possible alternative water resources systems and to identify the best systems for the desired goals in developing countries where the problems such as shortage of foreign currency, non-equilibrium of market conditions, unemployment, etc. generally exist. The standardized cost-effectiveness as proposed by Kazanowski is followed: (1) Define desired goals; (2) identify system requirements or specifications; (3) develop alternative systems for attaining desired goals; (4) establish systems evaluation criteria relating system capabilities to specifications; (5) select fixed-cost or fixed-effectivness approach; (6) determine capabilities of alternative systems; (7) generate system versus criteria array; (8) analyze merits of alternative systems; (9) perform sensitivity analysis; and (10) document the rationale, assumptions and analyses underlying the previous steps. An example of the application of the approach in designing water resources systems in the Lower-Mekong Basin is presented. Classical methods of project analysis, such as cost-benefit analysis, are contrasted with the approach. Net benefit or the cost-benefit ratio are imbedded as one of the criteria in the fourth step of the cost-effectiveness procedure. (Bell-Cornell)
W74-00171

WATER RESOURCE DEVELOPMENT PROBLEMS IN A RURAL AREA IN TRANSITION,
Montana State Univ., Bozeman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06A.
W74-00173

JOINT USE OF SCREENING AND SIMULATION MODELS IN MULTIOBJECTIVE PLAN FORMULATION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
E. A. McBean, and J. C. Schaake, Jr.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 46 p, 20 fig, 25 ref, 3 append.

Descriptors: Water resources, *Planning, *Model studies, *Simulation analysis, *Linear programming, National income, Costs, Benefits, Hydrology, Optimization, Irrigation, Reservoirs, Systems analysis.
Identifiers: *Screening models, *Argentina (Rio Colorado), Regional income.

Water resources planning should consider relevant social objectives such as national economic development, environmental quality, social well-being, and regional development. Some multiobjective planning procedures and principles developed for water resources planning in Argentina are presented; the methodology was applied to a case study of the Rio Colorado. Because of the complexity of this river, this article creates a simple example to illustrate the central points of the methodology and its application in Argentina. The aim in plan formulation is to identify those alternatives which lie on or near the net benefit transformation surface. This search may be assisted by mathematical programming and simulation models, and the use of a linear programming screening model and simulation analysis is described. The basis for the joint use of screening and simulation models in multi-objective planning is illustrated. A screening model 'screens'-out inferior alternatives by suggesting system configurations that would be optimal under certain assumed perferences for the system outputs; simulation models may be used to evaluate management and investment alternatives, and then used to estimate coefficients or parameters for screening models. (Bell-Cornell)
W74-00177

STATE WATER RESOURCE PLANNING IN ARID ARIZONA,
W. E. Steiner.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 16 p.

Descriptors: *Water resources, *Planning, *Water supply, *Arizona, *Southwest U.S., *Arid lands, Input-output analysis, Groundwater basins, Economics, Engineering, Water allocation (Policy), Evaluation, Costs, Water users, Water quality, Water quantity, Population, Growth, Systems analysis, Mathematical models.
Identifiers: Environmental impact, Residential development.

Arizona's demand for water exceeds the supply and, as the population continues to increase, it appears that the future forbodes an even greater imbalance. Three problems faced in Arizona and the planning approaches undertaken by state government are discussed. First, southwestern states must decide whether to submit to costly augmentation of their available supplies or to live within the resources currently available and to modify use patterns and habits accordingly. Arizona proposes to develop plans for meeting each of these two alternative futures and to evaluate the costs and environmental impact for each plan. Second, the arid southwest faces problems in allocating amongst

competing uses and users. Arizona has utilized a computerized engineering systems approach which integrates an economic input-output model of the State's economy and engineering models of all water supply systems and the groundwater basins, to determine the allocation among users that would maximize the State's economy, minimize total water supply costs for all sources of water, and equalize groundwater declines to the extent practicable. And third, profligate development of new residential subdivision occurs in areas of severely limited water supplies. Before lot sales can commence in Arizona, the State must approve the adequacy of water supply for new subdivisions, regarding quality and quantity. (Bell-Cornell)
W74-00181

COST-EFFECTIVENESS ANALYSIS OF DISPOSAL SYSTEMS,
For primary bibliographic entry see Field 05E.
W74-00184

OPTIMIZATION OF MULTIPLE RESERVOIR SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 04A.
W74-00188

GROUND WATER RECHARGE, SOUTHERN REGIONAL DISTRICT, MONTGOMERY COUNTY, OHIO, ENGINEERING STUDY AND REPORT, PHASE I.
Moulenbelt and Seifert, Dayton, Ohio.
For primary bibliographic entry see Field 04B.
W74-00439

FROM RESORT AREA TO URBAN RECREATION CENTER: THEMES IN THE DEVELOPMENT OF LAKE TAHOE 1946-1956,
California Univ., Davis. Inst. of Governmental Affairs.
W. T. Jackson, and D. J. Pisani.
Environmental Quality Series No 15. April, 1973. 87 p, 2 fig.

Descriptors: *Water supply, *Sewage, *Lake Tahoe, *Public utilities, *Recreation, Environmental effects, Public Utility District, Urban land use, History, *California, *Nevada.
Identifiers: *Resort community, Historical development.

Lake Tahoe's development as a resort center dates to 1924. After World War II, improved access by highway and air, development of winter sports facilities and an increase in residential building began to tax Tahoe City's water supplies. Controversy over public and private use of beaches, building and zoning codes, and land use occurred in the 1940's and 1950's. Small private utility companies supplied water between 1946-1956, many of these being absorbed into public utility districts as communities expanded. California and Nevada Departments of Public Health demonstrated considerable concern over sewage systems draining into the Lake and into the Truckee River, the natural outlet of the Lake. As pollution increased bond issues to provide a new sewage system at Tahoe City were defeated by voters and court actions became frequent. Conflict between those wishing to preserve and those wishing to develop the environment became evident. Attempts at bi-state cooperation over the water level controversy including the Truckee River Agreement which set maximum and minimum levels of the lake, and the proposed building of the Prosser Reservoir for storage by the Corps of Engineers, are traced. Problems of sewage disposal were also tackled on a bi-state basis often involving bitter conflict. Problems of jurisdiction and finance continue. (Edwards-North Carolina)
W74-00441

SKIPPACK WATERSHED AND THE EVANSBURG PROJECT: A CASE STUDY FOR WATER RESOURCES PLANNING,
I. L. McHarg, and M. G. Clarke.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco, 1973. C. R. Goldman, editor, p 299-330, 3 fig, 48 ref.

Descriptors: *Water quality, *Land use, *Reservoirs, Methodology, *Planning, Water supply, Pennsylvania, Regional Development, *Pennsylvania.
Identifiers: *Ecological planning approach, Skippack Watershed (Penn), Montgomery County (Penn.), Evansburg Reservoir (Penn.), Urban growth.

An ecological approach to planning developed in a study of Skippack Watershed in Montgomery County, Pa., where a controversy emerged over a proposed state reservoir project. Models of uncontrolled growth indicate that in the next 15 years the watershed will change from a rural area on the fringe of suburbia to a rapidly developing suburban area. From an ecological perspective, the watershed is a composite of resources, offering gradations of opportunities and constraints for all land uses. Some conclusions were: the proposed Evansburg Reservoir would be quite eutrophic if present water quality were not significantly improved, the project would destroy significant remnants of the county's cultural heritage and there is no evidence that the project would be an economical solution to the region's water supply needs. A recommendation against its construction was thus made and an alternative of 2 intermediate recreation impoundments within an area for a state park suggested. Essence of the planning approach used is described including documentation of existing and anticipated urban growth to understand land-use demands; inventory of natural and cultural resources using a resource utilization matrix model to relate propspective land uses to the watershed's resources; kinds of cost and benefits considered varied with the specific resource and land use being evaluated; and evaluation of the environmental consequences of building the project. (Edwards-North Carolina)
W74-00445

WATER DEVELOPMENT AND URBAN RECREATION,
L. H. Scott.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco, 1973. C. R. Goldman, editor, p 341-353, 6 ref.

Descriptors: *Outdoor recreation, *Recreation, *Land use, *Planning, *Public access, Parks.
Identifiers: *Waterfront, *Shoreline, *Intergovernmental coordination, *Urban waterfront, Regional planning, Urban shorelines.

Policy recommendations made are: federal water development and conservation programs should be consolidated and coordinated; provision of public access should be made a condition of federal assistance programs in shoreline areas; environmental impact statements should consider potential for public access in each project; shoreline and coastal regulatory elements should be required in general, regional and state plans under state planning enabling legislation; private owners providing public access to shoreline should have tax relief; railroad rights-of-way that traverse city or county boundaries and shoreline areas should come under increased local jurisdiction; new federal assistance should be made available for purchase or less-than-fee easements to shorelines for public access; statutes controlling state port authorites should be amended to require public access in new projects; aid for transportation of poverty populations to distant water recreation facilities be considered; and that Model Cities programs be given 'Sign off' powers for all water development programs across federal agency lines to assure their input in these programs. Fragmented political jurisdictions, private industrial ownership of waterfront sites, conflicting land uses, and a lack of effective regional planning and institutions, have all contributed to limiting the realization of the potential of urban waterfronts for public use. A critical review is made of direct park acquisition, local general plans, zoning and subdivision ordinances, tax incentives, capital budgeting, urban renewal, and the Model Cities program, as they are concerned with providing public access and waterfront recreation sites. (Edwards-North Carolina)
W74-00446

METROPOLITAN DEVELOPMENT GUIDE, WATER RESOURCES POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.

May, 1973. 39 p, 2 fig.

Descriptors: *Water resources, *Surface drainage, *Water supply, *Water management, *Comprehensive planning, Planning, Water resources development, Urbanization, Water demand, Groundwater, Non-structural alternatives, Runoff, Water quality control, *Minnesota.
Identifiers: Water resource policies, *St. Paul (Minn.), *Minneapolis (Minn.).

The Metropolitan Council is directed by state law to prepare and adopt comprehensive development plans and policies for the Twin Cities metropolitan area. One element of this total development guide is the water resources policy plan. The policy plan is divided into three parts: a discussion of the general nature of water resources and related problems in the area; a long range poligy plan which contains 31 specific policy recommendations and is intended to guide future development and public projects in directions to alleviate water resource problems; and a list of long and short term objectives and the agencies responsible to implement them. The emphasis of the policy plan is on water supply and surface water drainage. Although the area has abundant supplies of surface water the increasing demands for water will require careful management and an increasing use of groundwater. During low flow periods there are likely to be shortages of water for cooling water and waste assimilation. Low flow augmentation measures in cooperation with the Corps of Engineers are being considered. Surface water drainage is becoming a significant problem as urbanization increases runoff, degrades water quality, and reduces groundwater recharge. Various policies are proposed to handle these problems, e.g. floodplain management measures, restricted extension of water and sewer lines. (Elfers-North Carolina)
W74-00451

COMPREHENSIVE PLAN FOR BATON ROUGE.
Baton Rouge City-Parish Planning Commission, La.
For primary bibliographic entry see Field 03D.
W74-00453

NATURAL ENVIRONMENTAL ANALYSIS, NASHVILLE-DAVIDSON COUNTY, TENNESSEE.
Metropolitan Government of Nashville-Davidson County, Tenn. Planning Commission.
For primary bibliographic entry see Field 03D.
W74-00455

PRELIMINARY REPORT OF PUBLIC UTILITIES ANALYSIS.
Janesville Div. of Public Works, Wis.
For primary bibliographic entry see Field 03D.
W74-00458

MUDDY CREEK DAM AND RESERVOIR, EMERY COUNTY, FEASIBILITY STUDY.
Rollins, Brown and Gunnell, Inc., Provo, Utah.
For primary bibliographic entry see Field 08A.
W74-00546

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ESTIMATING REGIONAL WASTEWATER TREATMENT COSTS,
Wisconsin Dept. of Natural Resources, Madison. Water Resources Planning Section.
For primary bibliographic entry see Field 05D.
W74-00169

DESIGN OF OPTIMAL SEWERAGE SYSTEMS,
Technion - Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 05D.
W74-00183

CAPITAL AND OPERATING COSTS OF POLLUTION CONTROL EQUIPMENT MODULES, VOLUME I, USER GUIDE,
ICARUS Corp., Silver Spring, Md.
For primary bibliographic entry see Field 05G.
W74-00307

CAPITAL AND OPERATING COSTS OF POLLUTION CONTROL EQUIPMENT MODULES, VOLUME II, DATA MANUAL,
ICARUS Corp., Silver Spring, Md.
For primary bibliographic entry see Field 05G.
W74-00308

METROPOLITAN COUNCIL FIVE-YEAR CAPITAL IMPROVEMENT PROGRAM FOR SEWERAGE FACILITIES.
Metropolitan Council of the Twin Cities Areas, Minn.
For primary bibliographic entry see Field 05G.
W74-00450

6D. Water Demand

WATER USE--COMMITTEE REPORT, PART II, REVIEW OF THE JOHNS HOPKINS UNIVERSITY RESEARCH PROJECT METHOD FOR ESTIMATING RESIDENTIAL WATER USE.
American Water Works Association, New York. Committee on Water Use.

Journal of American Water Works Association, Vol 65, No 5, p 300-301, May 1973. 1 illus.

Descriptors: Domestic water, *Water demand, *Use of water, Evapotranspiration, Utilities, Water requirements, Effective precipitation, Population density, Analytical techniques, Model studies, Planning, Research and development, Consumptive use, Public use.
Identifiers: *Residential water use.

A brief review is presented of a method developed by researchers at Johns Hopkins University for estimating residential water use. The project was sponsored by the Federal Housing Administration in cooperation with sixteen water utility companies. The applicability of the method developed as a practical tool for use by utility managers and engineers in estimating future residential average and peak flow requirements for particular communities is evaluated. The calculations made under the Johns Hopkins method require local data in the following areas: market value per dwelling unit, potential evapotranspiration, effective precipitation, and dwellings per acre. One serious problem with the method is that variation in market value in different sections of the country or changes in value due to inflation will result in a variation in the calculated water use. Thus, a regional market valuation should be considered and this may present a large problem to a utility whose personnel are not normally qualified to conduct such an appraisal. While the Johns Hopkins method does represent a commendable effort to determine water use on a theoretical basis, more research and experience are required before its general application can be recommended. (See also W73-10741) (McKnight-Florida)
W74-00121

ENERGY CONSERVATION STRATEGIES,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 06B.
W74-00152

RESERVOIR OPERATION FOR RECREATION USABILITY,
Toronto Univ. (Ontario). Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 04A.
W74-00185

AGRICULTURAL WATER ALLOCATION, LAND USE, AND POLICY,
Iowa State Univ., Ames. Center for Agricultural and Rural Development.
For primary bibliographic entry see Field 03F.
W74-00186

DEMOGRAPHIC EFFECTS OF WATER DEVELOPMENT,
J. Hollis, and J. McEvoy III.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco, 1973. C. R. Goldman, editor, p 216-232, 4 fig, 11 ref.

Descriptors: *Water demand, *Water supply, *Urbanization, Population, Water resources, *California.
Identifiers: *Population distribution, *Los Angeles, Consumption, Water-stimulated population growth.

From a demographic perspective the crux of the water problem in the U.S. lies in the discrepancy between the natural distribution of water supply and the distribution of consumers. Water use is increasing and projects are planned to meet the needs of an area in the foreseeable future, based on some projected or trend- based population likely to be overly optimistic. Construction of such projects usually insures that the projected population becomes a reality, so projects become both self-fulfilling and self-perpetuating expecially for urban centers in semi-arid parts of the U.S. Three national demographic trends, relatable to water demand and supply, are noted: absolute growth of population, the movement of people to the West, and increasing urbanization. There is an increasing tendency for population, especially urgan, to increase in those parts of the country with the most meager water resources. Urbanization creates an intense, almost constant, demand for high quality water in a very small area, to be met largely by adjacent surface water. Implications of a coastal-urban distribution of population are that considerable sums must be spent to find and appropriate distant water supplies. Los Angeles is the best example of a city owing its economic and demographic growth to the skillful management of its water supply and the foresight of its water planners. It is recommended that the Federal Government establish a poligy of carefully evaluating all population projections used as justification for water project proposals. (Edwards-North Carolina)
W74-00443

CENTRAL FRESNO COUNTY WATER AND LIQUID WASTE PROGRAM: VOLUME I--FINDINGS, CONCLUSIONS, RECOMMENDATIONS.
Grunwald, Crawford and Associates, Inc., Fresno, Calif; and Engineering-Science, Inc., Fresno, Calif.
For primary bibliographic entry see Field 03D.
W74-00457

6E. Water Law and Institutions

THE QUEST FOR WATER IN NEW MEXICO,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of History.
P. W. Christiansen.
Available from the National Technical Information Service as PB-224 449, $3.50 in paper copy, $1.45 in microfiche. New Mexico Water Resources Research Institute La Cruces, Technical Completion Report 029, August 1973. 65 p, 188 ref. OWRR A-026-NMEX (1).

Descriptors: *History, *Water resources development, *Irrigation systems, *New Mexico, *Water supply, Water control, Water utilization, Irrigation engineering, Water conveyance, Water users, Prior appropriation, Water wells, Farm management, Technology.

This study assembled historical data relating to water control and applied technology during Indian, Spanish, and Anglo-American periods in New Mexico. In addition, historic forces, such as law, social institutions, economic habits, irrigation practices, and transportation, affecting the development of water resources were laid out and evaluated, thereby giving a comparison of efforts and applications across the three major cultures making up New Mexico's historical pattern. The arid nature of New Mexico's climate forced all of its inhabitants, Indian, Spaniard, and Anglo-American alike, into maximum technical efforts toward water control. The Indian and the Spaniard tended to utilize similar techniques and generally practiced subsistence agriculture. Both Indian and Spanish villages have, by-and-large, clung to methods centuries old and have not had the opportunity or desire to utilize new scientific and technological advances. On the other hand, the Anglo-American settled in unoccupied areas, practiced commercial agriculture, and applied massive technology to water development. This heavy technical application in the major water courses resulted in important economic advances, but has also created serious problems which can only be solved by even more massive applications of technology. (Creel-New Mexico)
W74-00006

EDUCATION, ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT,
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 05G.
W74-00133

PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT,
Nebraska Livestock Feeders Association, Fairmont. Environmental Management Committee.
For primary bibliographic entry see Field 05G.
W74-00134

REGIONAL ADMINISTRATOR'S SUMMARY,
Agricultural Research Service, Peoria, Ill. North Central Region.
For primary bibliographic entry see Field 05G.
W74-00141

THE DEVELOPMENT OF METHODS FOR THE PLANNING OF UTILISATION AND PROTECTION OF YUGOSLAV WATER RESOURCES.
For primary bibliographic entry see Field 06A.
W74-00170

COST-EFFECTIVENESS OF WATER RESOURCES SYSTEMS DESIGN IN DEVELOPING COUNTRIES: CASE OF THE LOWER MEKONG,
Arizona Univ. Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 06B.
W74-00171

SCHEDULING AND SEQUENCING IN WATER RESOURCE INVESTMENT MODELS,
Cuyo Univ., Mendoza (Argentina). Escuela de Economica.
For primary bibliographic entry see Field 06A.
W74-00172

TRANSFER OF WATER RESOURCES KNOWLEDGE.
For primary bibliographic entry see Field 10A.
W74-00189

ECONOMIC ANALYSIS AND MUNICIPAL WATER SUPPLY IN DEVELOPING COUNTRIES,
International Bank for Reconstruction and Development, Washington, D.C.
For primary bibliographic entry see Field 10A.
W74-00190

PUERTO RICO: A CASE STUDY OF WATER RESOURCE TECHNOLOGY TRANSFER,
Puerto Rico Dept. of Public Works, San Juan. Area of Natural Resources.
For primary bibliographic entry see Field 10A.
W74-00197

TRANSFER OF KNOWLEDGE IN WATER RESOURCES FROM RESEARCH TO PRACTICE,
European Economic Commission, Geneva (Switzerland). Environment Div.
For primary bibliographic entry see Field 10A.
W74-00198

THE ROLE OF THE INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE IN THE TRANSFER OF WATER RESOURCES KNOWLEDGE,
Bureau of Reclamation, Denver, Colo. Technical Services Branch.
For primary bibliographic entry see Field 10A.
W74-00199

TECHNICAL AID FOR HYDROLOGIC STUDIES IN SPANISH-SPEAKING COUNTRIES,
Geological Survey, Lakeland, Colo.
For primary bibliographic entry see Field 10A.
W74-00202

WATER RESOURCES DEVELOPMENT POLICIES AND TRANSFER OF KNOWLEDGE FROM DEVELOPED TO DEVELOPING COUNTRIES,
Tahal Consulting Engineering Ltd., Tel Aviv (Israel).
For primary bibliographic entry see Field 10A.
W74-00206

WATER RESOURCES UTILIZATION IN DEVELOPING COUNTRIES,
Universidad Central de Venezuela, Caracas.
For primary bibliographic entry see Field 10A.
W74-00207

OBSTACLES TO CONSIDERATION OF RESOURCES MANAGEMENT ALTERNATIVES: SOUTH ASIAN EXPERIENCE,
For primary bibliographic entry see Field 10A.
W74-00208

TRANSFER OF WATER RESOURCES KNOWLEDGE FROM DEVELOPED TO DEVELOPING REGIONS OF THE WORLD,
Engineering Science, Inc., Berkeley, Calif., and Engineering Science, Inc., McLean, Va. International Div.
For primary bibliographic entry see Field 10A.
W74-00209

KNOWLEDGE TRANSFER,
Utah State Univ., Logan. International Programs and Studies.
For primary bibliographic entry see Field 10A.
W74-00210

A CASE ON TRANSFER OF KNOWLEDGE IN WATER RESOURCES SYSTEMS PLANNING FROM A DEVELOPED REGION TO A DEVELOPING ONE, AND FROM RESEARCH TO APPLICATION,
Chile Univ., Santiago. Faculty of Physical and Mathematical Sciences.
For primary bibliographic entry see Field 10A.
W74-00211

VENEZUELAN EXPERIENCE ON THE TRANSFER OF KNOWLEDGE IN WATER RESOURCES ENGINEERING,
Universidad Central de Venezuela, Caracas.
For primary bibliographic entry see Field 10A.
W74-00213

ACHIEVEMENTS OF INDIA IN THE FIELD OF WATER RESOURCES DEVELOPMENT,
Central Water and Power Commission, New Delhi (India).
For primary bibliographic entry see Field 10A.
W74-00214

EXPERIENCE OF THE U.S. GEOLOGICAL SURVEY IN TRANSFER OF HYDROLOGIC KNOWLEDGE TO THE DEVELOPING COUNTRIES,
Geological Survey, Washington, D.C. Office of International Activities.
For primary bibliographic entry see Field 10A.
W74-00215

SOME PROBLEMS ASSOCIATED WITH THE USE OF FOREIGN ADVISORS IN DEVELOPING COUNTRIES,
Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 10A.
W74-00216

TRANSFER OF KNOWLEDGE IN WATER RESOURCES FROM DEVELOPED TO DEVELOPING REGIONS WITH SPECIAL REFERENCE TO THE CONDITIONS OF WEST PAKISTAN,
Ministry of Finance, Planning and Development, Islamabad (Pakistan). Div. of Water Resources.
For primary bibliographic entry see Field 10A.
W74-00217

DEVELOPMENT OF MATHEMATICAL MODELING CAPABILITIES FOR THE VISTULA RIVER PROJECT, POLAND,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 10A.
W74-00218

METHODS OF TRANSFER OF WATER RESOURCES KNOWLEDGE FROM DEVELOPED TO DEVELOPING REGIONS WITH SPECIAL EMPHASIS TO ON-FARM WATER MANAGEMENT,
Agency for International Development, Washington, D.C. Office of Agriculture and Fisheries.
For primary bibliographic entry see Field 10A.
W74-00219

GUIDELINES FOR TRANSFER OF PRACTICE TO APPLICATIONS FOR OPTIMUM ON PLANNING OF KEY ITEMS OF WATER RESOURCE PROJECTS,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
For primary bibliographic entry see Field 10A.
W74-00220

NEW FRONTIERS IN DRAINAGE AND RECLAMATION ENGINEERING IN THE INDUS PLAINS,
For primary bibliographic entry see Field 10A.
W74-00221

AN IHD PROJECT FOR TECHNOLOGY TRANSFER TO DEVELOPING REGIONS,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 10A.
W74-00222

THE ROLE OF FAO IN THE TRANSFER OF WATER RESOURCES KNOWLEDGE TO DEVELOPING REGIONS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Land and Water Development Div.
For primary bibliographic entry see Field 10A.
W74-00223

TECHNICAL ACTIVITIES BY FAO IN THE TRANSFER OF WATER RESOURCES KNOWLEDGE TO DEVELOPING REGIONS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Land and Water Development Div.
For primary bibliographic entry see Field 10A.
W74-00224

TRANSFER OF KNOWLEDGE IN WATER RESOURCES POLICIES FROM DEVELOPED TO DEVELOPING COUNTRIES,
United Nations Water Resources Development Center, New York.
For primary bibliographic entry see Field 10A.
W74-00225

TRANSFER OF WATER RESOURCES KNOWLEDGE THROUGH THE UNITED NATIONS TECHNICAL ASSISTANCE ACTIVITIES,
United Nations Water Resources Development Center, New York.
For primary bibliographic entry see Field 10A.
W74-00226

RECENT DEVELOPMENT OF HYDROLOGICAL SERVICES IN COLOMBIA,
World Meteorological Organization, Bogota (Colombia).
For primary bibliographic entry see Field 10A.
W74-00227

TRANSFER OF WATER RESOURCES KNOWLEDGE ASPECTS OF THE WORK OF THE UNITED NATIONS SYSTEM,
United Nations Educational, Scientific and Cultural Organization, Paris (France). Office of Hydrology.
For primary bibliographic entry see Field 10A.
W74-00228

RULES, REGULATIONS AND MODES OF PROCEDURE, RELATING TO THE TEXAS WEATHER MODIFICATION ACT, V.A.T.S. WATER CODE, CHAPTER 14.
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 03B.
W74-00357

THE POLITICS OF WATER POLLUTION,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 05G.
W74-00391

WISCONSIN'S SHORELAND PROTECTION PROGRAM: A STATE-LOCAL REGULATORY APPROACH TO NATURAL RESOURCE PRESERVATION,
D. A. Yanggen.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco, 1973. C. R. Goldman, editor, p 354-375, 2 fig, 9 ref.

Descriptors: *Water quality control, *Wisconsin, Regulation, *Shore protection, *Shores, *Zoning.
Identifiers: *Shoreland protection, Shoreland Protection Law of 1966.

Under Wisconsin's Shoreland Protection Act of 1966, the state establishes minimum standards for local land use controls and retains the authority to adopt regulations if the local government fails to act. While a number of federal attempts have been made to establish the basis of a national land use policy for protecting the environment and to encourage state action on land use planning and controls, only the Coastal Zone Management Act of 1972, concerned with coastal waters and adjacent shorelines, has become law. Nevertheless, a few states have acted to assert control over land uses affecting the environment, and among these is Wisconsin's Shoreland Protection Law of 1966 which is an attempt to protect the natural resource values of shorelands through a joint state and county regulatory effort. The statute sets out broad policy objectives of shoreland protection, special zoning objectives, directions for a state agency to prepare standards and criteria for local navigable water protection regulations, creates special shoreland corridors of 1000 foot depth for county zoning of unincorporated areas adjacent to navigable waters, and authorizes state level zoning on an unprecedented scale if counties fail to adopt adequate ordinances meeting minimum state standards. Essentially a natural resource oriented development code, regulations appling to all shoreland areas include minimum standards for water supply and waste disposal, tree-cutting controls, setbacks for structures from highways and navigable waters, minimum lot sizes, filling and grading limits, lagooning and dredging controls, and subdivision regulations. (Edwards-North Carolina)
W74-00447

METROPOLITAN DEVELOPMENT GUIDE, WATER RESOURCES POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 06B.
W74-00451

RIVERS AND AMERICANS: A CENTURY OF CONFLICTING PRIORITIES,
For primary bibliographic entry see Field 06G.
W74-00454

6F. Nonstructural Alternatives

WISCONSIN'S SHORELAND PROTECTION PROGRAM: A STATE-LOCAL REGULATORY APPROACH TO NATURAL RESOURCE PRESERVATION,
For primary bibliographic entry see Field 06E.
W74-00447

CASE DESCRIPTION: MORRISON CREEK STREAM GROUP BASIN, CALIFORNIA,
M. S. Petersen.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco, 1973. C. R. Goldman, editor, p 465-477, 2 fig, 2 append.

Descriptors: *Flood control, *Flood protection, Planning, Environmental effects, *California, Land use, Floodways, Political aspects, Urbanization.
Identifiers: *Public participation, *Citizen involvement, Retardation basins, Morrison Creek Stream Group Basin.

In May, 1969, U.S. Corps of Engineers, Sacramento District, made public a tentative plan for flood protection and recreation in the Morrison Creek Group Basin. The nature of the basin and water related problems and the characteristics of the plan are presented. Conservation interests criticized the plan because wildlife habitat could feasibly be converted to urban use. The Corps expanded its planning process to include private interests and public agencies. Alternatives were developed and one selected with concurrence of Sacramento County, the local project sponsor. The alternative substituted a flood retardation basin in place of a leveed floodway. The author, a planner with the Corps, states: 'the Corps regarded the views expressed as legitimate criticism representing the position of large number of residents of the Sacramento metropolitan area. It was apparent that the Corps needed a clearer view of the preferences of citizens...' Public involvement techniques centered on limited public meetings and the establishment of a Citizens Environmental Advisory Committee. In an attempt to head off potential conflicts public sectors are now involved early in studies and continue to be present. (Edwards-North Carolina)
W74-00448

6G. Ecologic Impact of Water Development

REGIONAL PERSPECTIVES,
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 05G.
W74-00123

WATERSHED PROGRAM LACKS ECOLOGICAL DIMENSIONS,
L. R. Jahn.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco, 1973. C. R. Goldman, editor, p 183-195, 4 fig, 16 ref.

Descriptors: *Small watersheds, *Ecosystems, *Degradation (Stream), Environmental effects, Conservation, Channel improvement, Land use, Wetlands.
Identifiers: Floodplain management.

Two of the most serious problems of the small watershed program involve maintaining valuable wetlands and streams and their associated shorelands and flood plains from inappropriate physical developments. Vast amounts of drainage, including channelization, have been applied in a detrimental manner leading to degradation and destruction of ecological systems, environmental quality, and public values. Outdated Congressional directives, misleading terminology, inadequate cost-benefit calculations and lack of independent ecological review have resulted in incomplete planning of projects. An ecological dimension must be incorporated into watershed planning and development. Immediate evaluation of watershed projects should include: post-construction investigations of the 273P.L. 566 watersheds completed by July, 1970 and upstream watershed projects authorized through earlier enacted laws;reexamination of 1,288 watersheds approved for federal planning assistance; and pre-authorization evaluations of 8,904 small watersheds with problems as identified by the National Soil and Water Conservation Needs Inventory. State and federal resource agencies should inventory land and water resources in each proposed watershed project in sufficient detail to permit designation of important landscape features for maintenance and ecological management. Special concern should be given to protected stream sections, flood plains, wetlands, sites to hold excess runoff waters, and other unique features such as recharge areas. (Edward-North Carolina)
W74-00442

MAN'S EFFECT ON THE GREAT LAKES,
For primary bibliographic entry see Field 04C.
W74-00444

RIVERS AND AMERICANS: A CENTURY OF CONFLICTING PRIORITIES,
R. Nash.
In: Environmental Quality and Water Development, W. H. Freeman and Co., San Francisco, 1973. C. R. Goldman, editor, p 78-94, 10 ref.

Descriptors: *Water supply, *Political aspects, *Reservoir construction, *California, Environmental effects, Conservation, Developed waters, History, Dams, Reservoir sites, Reservoirs.
Identifiers: San Francisco, *Hetch Hetchy Valley (Calif), Yosemite National Park.

From 1905 to 1913, a controversy raged as to whether California's Hetch Hetchy Valley in Yosemite should remain inviolate as a national park or be used as a water supply reservoir for the needs of the city of San Francisco. The outline of the battle for development of Hetch Hetchy Valley is described. Ideas for such use for water supply and hydro-electric power--arose as early as 1882, although urgency and public sympathy for San Francisco's search for water increased with the earthquake and fire of 1906. Application for the use of the valley was approved by the Secretary of the Interior in 1908, however conservationists, especially John Muir, attempted to build Hetch Hetchy into a symbol of ethical and aesthetic qualities in opposition to its use. Because of strong opposition San Francisco's application died in the Sixtieth Congress. More debate and additional hearings preceded signature of the bill permitting development in December, 1913 by President Wilson. That the controversy occurred at all is held to be significant. Changes in public attitudes toward conservation occurred in the next half century and the burden of proof was placed on proponents of development. The Echo Park Dam controversy demonstrated the power of private citizen-action conservationist groups while intervention by conservationists resulted in Marble and Bridge Canyon dams along the Colorado River not being built. New river development projects whould be reviewed for their environmental impact. (Edwards-North Carolina)
W74-00454

07. RESOURCES DATA

7A. Network Design

EXPECTED OPTIMUM RECORD LENGTH AS A BASIS FOR HYDROLOGIC NETWORK DESIGN,
Geological Survey Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 07C.
W74-00178

RESEARCH AND EDUCATION FOR DEVELOPMENT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 10A.
W74-00212

DRAINAGE AREAS OF TEXAS STREAMS, LAVACA RIVER BASIN.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02E.
W74-00548

7B. Data Acquisition

AN ELECTRONIC SENSOR AND CIRCUIT FOR AUTOMATIC OPERATION OF RAINFALL SHELTERS,
Mississippi State Univ., State College. Dept. of Agronomy.
C. M. White, D. L. Myhre, and S. G. Williams.
Agron J., Vol 64, No 6, p 847-849, 1972, Illus.
Identifiers: *Automation, *Electronic equipment, Operations, *Rainfall shelters, Sensors.

A simple, inexpensive, and durable electronic sensor for automatic operation of rainfall shelters for research plots is described. The advantages of the new circuit are: the very high input resistance overcomes problems associated with low conductivity of rainfall; the limited amount of current through the grid reduces corrosion; and the time delay prevents reversing of the shelters while in motion. Provision for heating the sensor grid prevents condensation of dew and hastens evaporation on cloudy days after rain stops.--Copyright 1973, Biological Abstracts, Inc.
W74-00042

MODIFICATION OF THE WAY OF READING THE VALUES OF RESISTANCE MEASURED BY MEANS OF THE PNEUMATIC SOIL RESISTANCEMETER (PENETROMETER TYPE), (IN POLISH),
Instytut Uprawy Nowozenia i Gleboznawstwa, Pulawy (Poland).
S. Tokarz.
Pamiet Pulawski, 45, p 85-91, 1971, Illus, English summary.
Identifiers: Measurement, Meters, Modification, Penetrometer, *Pneumatic meters, *Soil meters, Type.

A solution to the problem of recording the values of soil resistance to penetration, measured by means of Rzasa's pneumatic resistancemeter is presented. The results of measurements from the whole depth are recorded in graphic form. The use of recorder allows a reduction in the number of persons tending the apparatus from three to two to one. It also allows improvement of the exactness of measurements and the obtention of resistance values on the whole depth of the measurement.--Copyright 1973, Biological Abstracts, Inc.
W74-00051

USE OF THE MODEL T COULTER COUNTER IN SIZE ANALYSIS OF FINE TO COURSE SAND,
University of East Anglia, Norwich (England). School of Environmental Sciences.
For primary bibliographic entry see Field 02J.
W74-00103

SETTLING BEHAVIOUR RELATED TO SIEVE ANALYSIS OF SKELETAL SANDS,
Dundee Univ. (Scotland). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-00105

USE OF THE GAMMA FIELD OF THE EARTH TO DETERMINE THE WATER CONTENT OF SOILS,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02G.
W74-00108

RESULTS OF AN OPERATIONAL TEST OF M--100 RADIO-ELECTRONIC SNOW GAGES,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02C.
W74-00109

EFFECT OF AN ERROR IN THE DETERMINATION OF THE MAXIMUM WATER EQUIVALENT OF SNOW IN A BASIN ON THE FORECAST ACCURACY OF THE SPRING FLOOD VOLUME,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02C.
W74-00110

WATER POLLUTION,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05A.
W74-00124

APPLICATION OF HIGH-SPEED LIQUID CHROMATOGRAPHY TO ORGANIC MICROANALYSIS. I. CONSTRUCTION OF A SIMPLE AND INEXPENSIVE APPARATUS,
City Univ. of New York.
For primary bibliographic entry see Field 02K.
W74-00249

VOLTAMMETRIC DETERMINATION OF NITRATE AND NITRITE IONS USING A ROTATING CADMIUM DISK ELECTRODE,
Iowa State Univ., Ames. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00251

ULTRATRACE ANALYSIS (BELOW P.P.B.) BY COUPLING CENTRIPETAL THIN-LAYER CHROMATOGRAPHY AND GAS CHROMATOGRAPHY,
Ceskoslovenska Akademie Ved, Brno. Ustav Instrumentalni Analyticke Chemie.
For primary bibliographic entry see Field 05A.
W74-00255

ON THE QUANTITATIVE DETERMINATION OF FREE CARBON DIOXIDE IN NATURAL WATERS, (ZUR QUANTITATIVEN BESTIMMUNG DER FREIEN KOHLENSAURE IN NATURLICHEN WASSERN),
For primary bibliographic entry see Field 02K.
W74-00263

COUPLING OF HIGH SPEED PLASMA CHROMATOGRAPHY WITH GAS CHROMATOGRAPHY,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
For primary bibliographic entry see Field 02K.
W74-00271

MULTIELEMENT INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF BIOLOGICAL MATERIALS,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00289

IN SITU MEASUREMENT OF SEDIMENT SOUND SPEED DURING CORING,
Texas Univ., Austin. Applied Research Labs.
For primary bibliographic entry see Field 02J.
W74-00294

SEA-SURFACE CIRCULATION, SEDIMENT TRANSPORT, AND MARINE MAMMAL DISTRIBUTION, ALASKA CONTINENTAL SHELF,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 02J.
W74-00298

METHODS OF KARST INVESTIGATION (METODY IZUCHENIYA KARSTA),
For primary bibliographic entry see Field 02K.
W74-00345

INVESTIGATION OF ICE MOVEMENT ON MOUNTAIN GLACIERS BY STEREOPHOTOGRAMMETRY (ISSLEDOVANIYE DVIZHENIYA L'DA GORNYKH LEDNIKOV STEREOFOTOGRAMMETRICHESKIM METODOM),
For primary bibliographic entry see Field 02C.
W74-00346

BACTERIAL FLAGELLAR UNCOORDINATION AS A MONITOR FOR INDUSTRIAL POLLUTANTS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-00438

A SIMPLE PRINCIPLE FOR DOSING APPARATUS IN AQUATIC SYSTEMS,
Umea Univ. (Sweden). Dept. of Ecological Zoology.
B. E. Bengtsson.
Arch Hydrobiol. Vol 70, No 3, p 413-415. 1972. Illus.
Identifiers: Apparatus, Aquatic, *Dosing apparatus, Toxicology.

A dosing apparatus for toxicological investigations was constructed. The working unit is driven by the diluting water and no other power supply is needed. The apparatus is easily built in a workship and the price is remarkably low in comparison with most commercial dosing pumps.--Copyright 1973, Biological Abstracts, Inc.
W74-00473

APPLICATION OF ECOLOGICAL, GEOLOGICAL AND OCEANOGRAPHIC ERTS-1 IMAGERY TO DELAWARE'S COASTAL RESOURCES PLANNING,
Delaware Univ., Newark. Coll. of Marine Studies.
V. Klemas.
Available from NTIS, Springfield, Va., 22151, E73-10426 Price $3.00 printed copy; $1.45 microfiche. Contract report to Goddard Space Flight Center, March 29, 1973. 6 p, 4 ref.

Descriptors: *Remote sensing, *Aerial photography, *Satellites (Artificial), *Vegetation, *Delaware River , Bays, Estuareis, Tides, Salinity, Turbidity, Data collections, Sampling, Correlation analysis, Coasts, Marshes.
Identifiers: *Delaware Bay area.

Imagery from four successful ERTS-1 passes over the Delaware Bay and Atlantic Coastal Region have been evaluated to determine visibility of aquatic features. The overpasses took place on August 16, October 10, December 3, 1972, and January 26, 1973. Visual inspection, density slicing and multispectral analysis of the imagery revealed strong suspended sediment patterns and several distinct types of aquatic interfaces or frontal systems. Measurements from boats and photography from low altitude aircraft, performed before and during the satellite overpasses, permitted a limited degree of correlation between satellite and ground data on the type and quantity of suspended matter. Multispectral analysis of high altitude RB-57 and U-2 photographs indicated that five vegetation communities could be clearly discriminated from 60,000 feet altitude including (1) salt marsh cord grass (Spartina alterniflora), (2) salt marsh hay and spike grass (Spartina patens and Distichlis spicata), (3) reed grass (Phragmites communis), (4) high tide bush and sea myrtle (Iva species and Baccharis halimifolia), and (5) a group of freshwater fowl. (Woodard-USGS)
W74-00540

7C. Evaluation, Processing and Publication

PROCESSING OF RESULTS OF OBSERVATIONS OF SPRING DISCHARGE,
Ceskoslovenska Akademie Ved, Brno. Geograficky Ustav.
For primary bibliographic entry see Field 02E.
W74-00096

SYSTEMS ANALYSIS MADE EASY FOR WATER RESOURCES PLANNERS,
Montana State Univ., Bozeman. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W74-00167

ROLE OF DIGITAL COMPUTER MODELS OF AQUIFERS IN WATER RESOURCES PLANNING: CASE STUDY IN TUCSON, ARIZONA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 04B.
W74-00176

EXPECTED OPTIMUM RECORD LENGTH AS A BASIS FOR HYDROLOGIC NETWORK DESIGN,
Geological Survey Washington, D.C. Water Resources Div.
M. E. Moss.
Presented at: The International Symposium on the Planning of Water Resources, Mexico City, December 4-8, 1972. 21 p, 3 fig, 10 ref.

Descriptors: *Hydrologic data, *Design, *Networks, *Data collections, *Simulation analysis, Operating costs, Optimization, Methodology, Water resources, Planning, Benefits, Evaluation, Parametric hydrology, Decision making, Systems analysis.
Identifiers: *Data evaluation, *Bayesian estimation.

Water resources planning necessitates providing sufficient hydrologic data at each decision point on the planning horizon. Design of a data collection network can be based upon the worth of these data in the planning and design process. Two methodologies for the evaluation of data worth, simulation and Bayesian estimation, are examined, and both are found to have some deficiencies as tools for network design. Attributes of each methodology are combined to define the expected optimum record lengh, which is an estimate of the length of record that maximizes expected net benefit derived from a decision that is deferred in order to collect additional data. Considered are the costs of operating the data collection system and the costs of delaying the decision. Alternate methods of attaining an equivalent expected optimum record length are discussed. Regional regression methods may suffice when the regional hydrologic-data base is sufficient. Parametric modeling may also be used to extract the required hydrologic information from a combination of relatively short hydrologic records and more generally available long meteorologic records. (Bell-Cornell)
W74-00178

OPTIMAL ALLOCATION OF LIMITED WATER RESOURCES,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 06A.
W74-00179

WATER RESOURCES SCIENTIFIC AND TECHNICAL INFORMATION DISPLAY, STORAGE, AND RETRIEVAL,
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 10A.
W74-00192

TRANSMITTING WATER RESOURCES INFORMATION BY A TIME-SHARE SYSTEM,
New Mexico State Univ., University Park.
For primary bibliographic entry see Field 10A.
W74-00194

AN ON-LINE SPECTROPHOTOMETER FOR COLLECTION OF MANIPULATION OF ABSORBANCE SPECTRA,
Georgia Univ., Athens. Dept. of Biochemistry.
R. J. DeSa, and J. E. Wampler.
Applied Spectroscopy, Vol 27, No 4, p 279-284, July/August, 1973. 5 fig, 1 tab, 6 ref. PHS-GM-16834-03.

Descriptors: *Automatic control, *Data collections, *Laboratory equipment, *Data transmission, *Date processing, Spectrophotometry, Instrumentation, Digital computers.
Identifiers: *On-line systems, *Absorption spectra, Ultraviolet spectrophometry, Ultraviolet spectra, Absorbance, Spectral analysis.

A uv-visible recording spectrophotometer has been developed which uses an on-line general purpose digital computer and the optical train of a conventional double beam recording spectrophotometer. The computer controls all functions of the instrument and permits the collection and manipulation of high quality absorption spectra without the use of electronic or optical correction devices. Spectra are represented by a series of up to 500 individual data points. Spectra can be manipulated in a variety of ways to meet particular experimental situations and can be displayed or plotted on an arbitrary absorbance scale. A spectrum can be added to, or substracted from, any other spectrum, differentiated, converted to log absorbance, or multiplied by an arbitrary factor. Data can be preserved on paper tape or presented graphically as a high quality labeled plot of variable size on either a wave-length or a wave number scale. The complete system can scan a full spectrum at a maximum rate of 30 nm/sec over any part of a range from 230 to 700 nm. Details of the system are presented with examples of its performance. (Little-Battelle)
W74-00272

FLOODS IN JACKSON QUADRANGLE, MISSISSIPPI,
Geological Survey, Washington, D.C.
K. V. Wilson.
Open-file atlas, 1 sheet, 1973. 5 fig, 1 photo, 1 map, 4 ref.

Descriptors: *Floods, *Flood data, *Flood profiles, *Flood frequency, *Mississippi, Flood plains, Flood damage, Flood protection, Hydrologic data, Maps, Hydrographs.
Identifiers: *Jackson floods (Miss), Atlas.

This one-sheet atlas presents hydrologic data that can be used to evaluate the extent of flooding that may be expected on Hanging Moss, Eubanks, Town, Lynch, Hardy, and Cany Creeks, and the Pearl River at Jackson, Miss. The technical information provided will aid in reaching decisions for sound economic management of flood-plain areas. The areas inundated by floods having a recurrence interval of 100 years are shown on a topographic map, with flood boundaries determined for 1972 channel conditions and conditions of urban development. Changed waterway openings at bridges and culverts, improved drainage systems, increased urbanization, retention structures, and other cultural changes may affect the boundaries of inundation by future floods. Also included are graphs showing flood frequency and flood profiles. (Woodard-USGS)
W74-00302

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 2. SOUTH ATLANTIC SLOPE AND EASTERN GULF OF MEXICO BASINS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-00303

ORGANIC POLLUTANT IDENTIFICATION UTILIZING MASS SPECTROMETRY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05A.
W74-00309

DIGITAL SIMULATION AND PROJECTION OF WATER-LEVEL DECLINES IN BASALT AQUIFERS OF THE ODESSA-LIND AREA, EAST-CENTRAL WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 02F.
W74-00326

DIGITAL MODEL OF THE HYDROLOGIC SYSTEM, NORTHERN HIGH PLAINS OF COLORADO--A PRELIMINARY REPORT,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02F.
W74-00330

STREAM GAUGING INFORMATION, AUSTRALIA--SUPPLEMENT 1971.
Australian Water Resources Council, Canberra.

Australia Government Publishing Service, Canberra, 1973. 43 p.

Descriptors: *Gaging stations, *Flow measurement, *Streamflow, *Network design, *Australia, Stream gages, Sites, Indexing, Drainage area, Data collections.

This publication is the second supplement to Stream Gauging Information, Australia,

December 1969, the first supplement being entitled Stream Gauging Information, Australia, Supplement 1970. It contains details of changes and additions made in the stream-gaging network during the 12 months period ending December 31, 1971. Two more supplements will be issued until a revised catalog, based on data as of December 31, 1974, is published. During 1971, 156 new stream-gaging stations were established, 37 were discontinued and 4 were reestablished. Seven gaging stations, which had previously been omitted, are included in the supplement. This increase of 130 brings the total number of gaging stations in operation on December 31, 1971 to 2,535. (Woodard-USGS)
W74-00350

TROPICAL CYCLONE PRECIPITATION IN NEW JERSEY,
Rutgers--The State Univ., New Brunswick, N.J. Dept. of Meteorology.
For primary bibliographic entry see Field 02B.
W74-00435

APPLICATIONS OF LINEAR INTEGER PROGRAMMING TO PROBLEMS OF LAND USE ALLOCATION,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 04A.
W74-00503

A METHOD FOR DETERMINING THE BEHAVIOR OF LONG WAVES CLIMBING A SLOPING BEACH,
North Carolina State Univ., Raleigh Dept. of Civil Engineering.
For primary bibliographic entry see Field 02G.
W74-00515

ENTHALP, A COMPUTER PROGRAM FOR THE CALCULATION OF AQUIFER CHEMISTRY IN HOT-WATER GEOTHERMAL SYSTEMS,
Geological Survey, Menlo Park, Calif. Geologic Div.
For primary bibliographic entry see Field 02F.
W74-00532

RECONNAISSANCE OF THE WATER RESOURCES OF BEAVER COUNTY, OKLAHOMA,
Geological Survey, Washington, D.C.
R. B. Morton, and R. L. Goemaat.
For sale by USGS, Washington, D.C. 20242, price $1.25 per set. Hydrologic Investigations Atlas HA-450, 1973. 3 sheets, 7 fig, 4 map, 1 tab, 18 ref.

Descriptors: *Water resources, *Groundwater resources, *Streamflow, *Water quality, *Oklahoma, Hydrogeology, Water wells, Aquifer characteristics, Water yield, Water utilization, Irrigation, Groundwater movement, Water level fluctuations, Groundwater recharge, Chemical analysis, Maps, Hydrographs, Hydrologic data.
Identifiers: *Beaver County (Okla).

Groundwater is the major source of water supply in Beaver County, Okla. Because of the rapidly increasing demand for the limited supply of water for irrigation, geologic data are presented to aid in the management of groundwater resources. This 3-sheet atlas presents general information on the availability of groundwater, on the chemical quality of water, and on streamflow. The chemical quality of water generally is poorer than that of water elsewhere in the Oklahoma Panhandle, and the ability to obtain good quality water may become increasingly difficult as the water resources are developed. The Ogallala Formation is the dominant surficial deposit and principal aquifer in Beaver County. The Ogallala is relatively thin in the county, and is breached in many places, particularly along tributaries of the Beaver River. Where streams have eroded the Ogallala, the underlying Permian red beds crop out in elongate patterns paralleling the stream channels. The greatest depth to water is about 225 feet below land surface in the southwestern part of the county near Gray. The shallowest water is less than 25 feet deep along the largest streams such as Kiowa Creek and the Beaver and Cimarron Rivers. The dissolved-solids concentrated in water from the Ogallala ranges from approximately 150 to 600 mg/liter. The largest streams in the county are the Cimarron and Beaver Rivers. Water flows in the Cimarron all of the year whereas the Beaver is dry one or more months during the year. (Woodard-USGS)
W74-00534

FLOOD OF JUNE 1972 AT ELMIRA, NEW YORK,
Geological Survey, Washington, D.C.
K. I. Darmer, and L. A. Wagner.
Available from USGS, Washington, D.C. 20402, Price $0.75. Hydrologic Investigations Atlas HA-518,1973. 1 sheet, 5 fig, 1 map, 1 photo.

Descriptors: *Floods, *Flood data, *New York, Maps, Hydrographs, Streamflow, Gaging stations, Flow rates, Peak discharge, Rainfall, Runoff, Flood profiles, Flood frequency, Flood peak, Historic floods, Hydrologic data.
Identifiers: *Elmira (NY).

This one-sheet atlas describes the greatest flood disaster in the history of New York which occurred during late June 1972 as a result of torrential rains brought by the remnants of Tropical Storm Agnes. The city of Elmira, in southwest-central New York, sustained the most extensive flooding of any populated area in the flood zone of New York. Flooding was primarily due to Chemung River, but Newtown Creek and Seeley Creek also experineced high flows. On June 23, 1972, the Chemung River at the Chemung gaging station crested at a stage of 31.62 feet corresponding to an elevation of 810.25 feet above mean sea level (discharge 189,000 cfs). The previous maximum stage at this station was 23.97 feet corresponding to an elevation of 802.60 feet above mean sea level (discharge 132,000 cfs) on May 28, 1946. Data presented in graphs include: cumulative precipitation from June 16 to 26, 1972, at Alfred and Elmira; annual floods above gage height 19.0 feet, 1904-72, Chemung River at Chemung; flood-frequency curve for Newtown Creek at Elmira, 1938-71; flood-frequency curve for Chemung River at Chemung 1904-71; and profile of floods of June 1972 and May 1946, Chemung River from Elmira to Chemung. (Woodard-USGS)
W74-00535

GEOHYDROLOGY OF DONIPHAN COUNTY, NORTHEASTERN KANSAS,
Geological Survey, Washington, D.C.
C. K. Bayne.
For sale by USGS, Washington, D.C. 20242, Price $0.75. Hydrologic Investigations Atlas HA-462, 1973. 1 sheet, 1 fig, 6 map, 1 tab, 13 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water wells, *Water quality, *Kansas, Hydrogeology, Geology, Water utilization, Water yield, Maps, Hydrologic data, Water table.
Identifiers: *Doniphan County (Kans).

This one-sheet atlas describes the groundwater resources of Doniphan County, the northeastern most county in Kansas. Reports describing the water resources of the area contiguous to Doniphan County are listed in the selected references. The locations of wells and test holes are identified according to the Federal system of land subdivision shown by a well-numbering system diagram. Adequate supplies of water for domestic and stock use generally are available from wells in the glacial deposits underlying the upland areas of Daoniphan County. Adjacent to the major streams, the alacial deposits are then or have been removed by erosion. In these localized areas, small supplies of water are available from wells drilled into bedrock aquifers. Large supplies of water are available only from wells in alluvial deposits in the Missouri River valley. The groundwater is hard or very hard but may be rendered soft by simple treatment. Water from wells in the Missouri River valley and in some tributary valleys is very high in iron content. Water containing excessive amounts of nitrate occurs locally in all the aquifers. (Woodard-USGS)
W74-00536

VARIATION OF THE LOW LEVEL WINDS DURING THE PASSAGE OF A THUNDERSTORM GUST FRONT,
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 02B.
W74-00545

RIVER MILE INDEX-SAN JOAQUIN RIVER, TULARE LAKE AND BUENA VISTA LAKE BASINS, CALIFORNIA.
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office.
For primary bibliographic entry see Field 02E.
W74-00549

RIVER MILE INDEX-KLAMATH RIVER, PACIFIC SLOPE BASIN, CALIFORNIA--OREGON.
Pacific Southwest Inter-Agency Committee, Sacramento. Water Management Technical Subcommittee.
For primary bibliographic entry see Field 02E.
W74-00550

08. ENGINEERING WORKS

8A. Structures

DESIGN OF OPTIMAL SEWERAGE SYSTEMS,
Technion - Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 05D.
W74-00183

HOW ENGINEERING RESEARCH IS REDUCED TO PRACTICE IN THE BUREAU OF RECLAMATION,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 10A.
W74-00200

RESEARCH FINDINGS AND THE DESIGN ENGINEER,
Auburn Univ., Ala.
For primary bibliographic entry see Field 10A.
W74-00201

CASE DESCRIPTION: MORRISON CREEK STREAM GROUP BASIN, CALIFORNIA,
For primary bibliographic entry see Field 06F.
W74-00448

BEACH NOURISHMENT FROM OFFSHORE SOURCES,
Gee and Jenson Construction Engineers, Inc., West Palm Beach, Fla.
For primary bibliographic entry see Field 02J.
W74-00522

MUDDY CREEK DAM AND RESERVOIR, EMERY COUNTY, FEASIBILITY STUDY.
Rollins, Brown and Gunnell, Inc., Provo, Utah.

Available from NTIS, Springfield, Va. 22152 as COM 73-10385 Price $3.00 printed copy; $1.45 microfiche. Report proposed for Utah Division of Water Resources, Salt Lake City, August 1971. 26 p, 15 fig, 13 tab.

Descriptors: *Dam design, *Water resources development, *Water supply, *Utah, Reservoirs, Flood control, Water utilization, Engineering structures, Costs, Economics, Irrigation, Recreation, Surveys, Hydrologic data, Planning, Projections, Evaluation.

The physical feasibility of constructing a dam and reservoir on Muddy Creek in Emery County, Utah, to be used to store water for irrigation of 8,066 acres of land on 67 farms is discussed. The project, when built, will include multipurposes such as fishing, waterborne recreation, flood control, soil conservation, and water-quality improvement. This investigations is sufficiently detailed to assure that a dam and reservoir can be constructed at an approximate cost of $1,600,000 and benefits, direct and indirect, substantially exceed the cost. This project would be in keeping with the goals and guidelines established by the State Board of Water Resources, which include the enhancement of life for rural areas of Utah, and the more efficient use of Utah's limited water supply. Pertinent information and data include: geology, climate, land classification, land use, land ownership, water rights, water supply, water quality, water requiremns, water development plan, flood protection, and dam design. (Woodard-USGS)
W74-00546

8B. Hydraulics

NAVIGATION CONDITIONS AT CONFLUENCE OF ARKANSAS, VERDIGRIS, AND GRAND RIVERS,
Army Enginner Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. J. Franco, and C. D. McKellar, Jr.
Available from NTIS, Springfield, Va., 22151, as AD-757 598, $3.00 in paper copy, $1.45 in microfiche. Technical Report H-73-2, March 1973. 31 pl, 9 photo, 32 plate, 1 tab.

Descriptors: *Channel improvement, *Navigation, *Model studies, *River training, *Oklahoma, Engineering structures, Hydraulic models, Harbors, Dredging, Locks, Dams.
Identifiers: *Arkansas River (Okla), Shoaling effects.

The development of an adequate navigation channel was investigated for the reach of the Arkansas River from the mouth of the Verdigris River downstream to below the new U.S. Highway 62 Bridge, as part of the Arkansas River multipurpose project. A movable-bed model reproducing about 5.7 miles of the Arkansas River in the Webbers Falls Lock and Dam pool, including the lower reaches of the Verdigris and Grand Rivers, to scales of 1:80 vertical and 1:120 horizontal was used for the study. The purpose was to develop a system of training structures that would reduce or eliminate shoaling at the confluence of the Verdigris and Arkansas Rivers, develop a channel through the navigation span of the new U.S. Highway 62 Bridge, and reduce the need for maintenance dredging in the Muskogee Harbor area, without producing currents that would be troublesome for navigation. Satisfactory navigation conditions will be provided with the plan developed, except that some shoaling might occur at the mouth of the Verdigris River during low Arkansas River flows and little or no flow in the Verdigris River. (Woodard-USGS)
W74-00539

8C. Hydraulic Machinery

ELECTRICAL POWER PLANT DRIVEN BY OCEAN WAVES AND TIDES,
J. Donatelli.
U. S. Patent No. 3,746,875, 5 p, 7 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 912, No 3, p 1105, July 17, 1973.

Descriptors: *Patents, *Electric powerplants, Ocean waves, Tides, *Tidal powerplants, *Powerplants, Tidal energy, *Generators, Electricial equipment.
Identifiers: *Floating platforms.

A floating platform is connected to a fixed structure which is mounted on the ocean floor. The platform is adapted to move with waves and tide. One generator is included which is driven by the up and down movement of the platform to generate electricity. The fixed structure is oriented to hold a landward edge portion of the floating platform towards a selected ocean shore and a seaward edge portion of the floating platform away from the selected shore. The platform is preferably constructed to slope from an elevated position above the water surface from both its seaward and landward edge portions toward its center, defining first and second paths of water flow. Other generating mechanisms, preferably including paddle wheels, are mounted across the first and second paths of flow to be driven by the water flowing therealong, thus generating electrical energy from the flow of waves and tides toward and away from the shore. A four-way electrical power plant is thus provided which operates to simultaneously generate energy from the up and down movement as well as from the two directional flow of ocean waves and tides towards and away from shore. (Sinha-OEIS)
W74-00092

DEMOLITION OF FT. MEADE DAM, STURGIS, SOUTH DAKOTA, JUNE 1972,
Army Engineer Waterways Experiment Station, Livermore, Calif. Explosive Excavation Research Lab.
For primary bibliographic entry see Field 08H.
W74-00322

8D. Soil Mechanics

LAKE OKEECHOBEE SEEPAGE MONITORING NETWORK,
Geological Survey, Talahassee, Fla.
For primary bibliographic entry see Field 04A.
W74-00337

STABILITY CRITERIA FOR BOUND-ROCK EROSION PROTECTION,
Connecticut Univ., Storrs. Inst. of water Resources.
For primary bibliographic entry see Field 04D.
W74-00390

8G. Materials

HYDRAULIC TESTING ACCOMPANYING DRILLING OF FIVE EXPLORATORY HOLES, PICEANCE CREEK BASIN, COLORADO,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 02F.
W74-00299

8H. Rapid Excavation

EFFECTS OF UNDERWATER DEMOLITION ON THE ENVIRONMENT IN A SMALL TROPICAL MARINE COVE,
Naval Underwater Systems Center, New London, Conn. New London Lab.
For primary bibliographic entry see Field 05C.
W74-00233

DEMOLITION OF FT. MEADE DAM, STURGIS, SOUTH DAKOTA, JUNE 1972,
Army Engineer Waterways Experiment Station, Livermore, Calif. Explosive Excavation Research Lab.
B. B. Redpath.
Available from NTIS, Springfield, Va. 22151 as AD-757 597; Price $3.00 printed copy; $1.45 Microfiche. Miscellaneous Paper E-73-1, January 1973. 12 p, 12 fig.

Descriptors: *Flood damage, *Dams, *Explosives, *Hydraulic engineering, *South Dakota, Dam failure, Concrete dams, Rupturing, Reservoirs, Water levels, Pumping, Water pressure, Costs, Flood protection.
Identifiers: *Dam demolition, *Ft. Meade Dam (S Dak).

A portion of a flood-weakened concrete and masonry dam was deliberately demolished by explosives in June 1972 near Rapid City, South Dakota. The demolition was carried out to forestall the possibility of the dam's collapse in the event of renewed flooding during the period of devastating floods in Rapid City. An 80- x 25-ft segment on the left abutment was cleanly removed by 3000 lb of explosives. The portion to be removed was outlined by explosively loaded 2-in. diameter holes on 1-ft centers, the reinforced concrete panels were broken up by seven 150-lb surface charges, and the broken material was ejected by a 1700-lb cratering charge emplaced in a cavity in the dam. All explosives were detonated simultaneously. The first step taken at the scene was to install several pumps to lower the water level, relieving the pressure on the dam. The work was accomplished in 4 days at a cost of perhaps $10,000 and would have required a month and perhaps as much as $50,000 if attempted with conventional construction equipment. (Woodard-USGS)
W74-00322

8I. Fisheries Engineering

EVALUATION OF COMMERCIAL FISHERY POTENTIAL OF WISCONSIN'S BOUNDARY WATERS OF LAKE SUPERIOR-WALLEYE,
Wisconsin Dept. of Natural Resources, Madison.
B. Belonger, and R. Poff.
Available from NTIS, Springfield, Va 22151 as COM-72-11165 Price $3.00 printed copy; $1.45 microfiche. Completion Report for NOAA, National Marine Fisheries Service, May 1971. 15 p, 10 fig, 4 tab. NOAA AFC-8.

Descriptors: *Fish population, *Walleye, *Wisconsin, Rivers, *Lake Superior, Tributaries, Fish migration, Census, Growth rates, Fish management, Tagging, Life cycles, Biology, Age, Ecology.
Identifiers: Chequamegon Bay (Wisc.), Iron River (Wisc.), Bad River (Wisc.).

Two areas of walleye fish concentration in western Lake Superior (Chequamegon Bay-Bad River, and Superior-Iron River) were sampled. Mark and recapture methods were employed to assess migration, growth, and exploitation of their populations. The walleye population in the western Lake Superior study area has low commercial fishery potential because of the present sport fishery, the slow growth rate, and the long

life span. Gill nets were lifted for 31 days with all fishing done during one-night outsets. The total catch was 858 walleye (including 12 tag returns--most of which were recaptured at or very near the point of tagging and within 5 days of tagging). Walleye size ranged in total length from 6.3 to 27.7 inches with 19.2 inches the median size for these fish captured in gill nets. Size distribution placed 93% of the walleye in the range of 17.0 to 21.9 inches. (Woodard-USGS)
W74-00094

THE ZOOPLANKTON OF A CARP POND UNDER CONDITIONS OF CONTINUOUS FILLING,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
L. Krzeczkowska-Woloszyn.
Acta Hydrobiol. Vol 14, No 3, p 307-315, 1972, Illus.
Identifiers: *Carp farms, Plankton, *Poland (Golysz), Ponds, *Zooplankton.

The effect of several years' filling of fish pond in Golysz (Cieszyn district) on the development of zooplankton was investigated. Seasonal variations and the influence of the fish stock on the quantity and qualitative composition of zooplankton are also discussed. The most intensive development of zooplankton was found in the first yr of the investigations, due to the first filling and utilization of the pond after its renovation. Permanent filling of the pond in the following years resulted in decreased amounts of zooplankton.--Copyright 1973, Biological Abstracts, Inc.
W74-00099

PARASITES, DISEASE, AND DISEASE CONTROL OF GREAT LAKES ANADROMOUS AND COMMERCIAL FISH,
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 05C.
W74-00229

OCCURRENCE AND DISTRIBUTION OF HELMINTH PARASITES OF FISHES FROM LAKE CARL BLACKWELL, OKLAHOMA,
Oklahoma State Univ., Stillwater.
For primary bibliographic entry see Field 05B.
W74-00230

SOME BIOLOGICAL ASPECTS OF CHANNEL CATFISH VIRUS DISEASE,
Auburn Univ., Ala.
For primary bibliographic entry see Field 05C.
W74-00231

FRAZER LAKE SOCKEYE INVESTIGATIONS, 1970,
Alaska Dept. of Fish and Game, Kodiak. Research Section.
P. A. Russell.
Available from the National Technical Information Service as COM-73-10238. Alaska Department of Fish and Game Informational Leaflet No. 159, September 1972. 83 p, 32 fig, 15 tab, 11 ref, 11 append. 14-17-0005-222.

Descriptors: *Fish migration, *Spawning, *Alaska, Timing, Smolt, Age, Fish management, Productivity, Fish reproduction, Fish establishment, Fish passages, Life history studies.
Identifiers: *Frazer Lake (Alaska), Kodiak (Alaska).

Research to assess the sockeye run at Frazer Lake, Kodiak Island, Alaska, from 1965 to 1970 is described. Smolt age composition in 1970 was 0.3% age 3.0, 31.6% age 2.0, 68.1% age 1.0 and 0.02% age 0.0. In 1970, age 0.0 smolt averaged 113 mm and 12 grams; age 1.0 smolt averaged 149 mm and 31 grams; age 2.0 smolt 180 mm and 54 grams; age 3.0 smolt 193 mm and 64 grams. Sockeye freshwater survival from potential egg deposition to smolt indicates an overall median value for survival rate as about 0.70%. Smolt length frequency analysis provided a quantitative method of determining length distribution parameters usable in conjunction with scale reading to infer age composition of smolt outmigrations. Pilot echo sounding studies showed diurnal migration patterns of yound sockeye. The number of sockeye entering Frazer Lake since 1956 has shown an increase with a peak return of 24,081 in 1970. Increase in sockeye spawner survival occurred in 1970 resulting from improved fishpass efficiency due to modifications and temporary lead construction. Limnological investigations included outlet temperatures and lake temperature profiles, plankton analysis, and a profile map of Frazer Lake. (Jones-Wisconsin)
W74-00232

LAKE HURON: EFFECTS OF EXPLOITATION, INTRODUCTIONS, AND EUTROPHICATION ON THE SALMOID COMMUNITY,
Department of Lands and Forests, Maple (Ontario). Research Branch.
For primary bibliographic entry see Field 05C.
W74-00244

MILL CREEK FISH PASSAGE FACILITY,
Washington State Dept. of Fisheries, Olympia.
R. W. Kramer.
Available from NTIS, Springfield, Va., 22151 as COM-72-11081 Price $3.00 printed copy; $1.45 microfiche. Completion Report to NOAA, National Marine Fisheries Service, September 1970. 5 p, 6 photo. AFC-32.

Descriptors: *Fish passages, *Salmon, *Hydraulic structures, *Fish migration, *Washington, Anadromous fish, Fish establishment, Fisheries, Fish reproduction, Spawning, Fish management, Waterfalls.
Identifiers: *Clallam County (Wash).

A fish passage facility was constructed through a falls in Mill Creek in Clallam County, Washington, in 1970 to open up 5 miles of spawning and nursery areas to coho salmon. Records of hatchery planting show that no salmon have been stocked in Mill Creek. In the summer of 1969, approximately 9 to 10 thousand coho fingerlings were salvaged from an adjacent dry stream channel and placed in this stream at several sites. Stocking of Mill Creek with coho salmon is anticipated to make use of the newly opened stream area. No chinook or other species of salmon are considered to be reared in this stream watershed. (Woodard-USGS)
W74-00351

THE DYNAMICS OF A GROUP OF PERCHES, PERCA FLAVESCENS (MITCHILL) IN THE GRANDE-ANSE COVE OF PERROT ISLAND IN SAINT-LOUIS LAKE, (IN FRENCH),
Montreal Univ. (Quebec). Dept. of Biological Sciences.
For primary bibliographic entry see Field 02H.
W74-00470

SYNOPSIS ON THE BIOLOGY OF THE SHRIMP OF RIO DEL NORTHE (CHILE), (IN SPANISH),
Chile Univ., Santiago. Departamento de Biologia.
For primary bibliographic entry see Field 02I.
W74-00471

ESTIMATION OF FISH PRODUCTION IN THE VOLGOGRAD WATER RESERVOIR, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Saratov (USSR).
For primary bibliographic entry see Field 02H.
W74-00480

ECOLOGICAL STUDIES ON THE PENAEUS ORIENTALIS KISHINOUE CULTURED IN A POND FILLED WITH SEA WATER: I. GROWTH RATE AS RELATED TO THE SUBSTRATE MATERIALS, SURVIVAL RATE, PREDATOR OF P. ORIENTALIS, AND WATER CONDITIONS OF CULTURING POND,
Seoul National Univ. (Republic of Korea). Coll. of Education.
For primary bibliographic entry see Field 05C.
W74-00486

09. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

GEORGIA'S WATER PROBLEMS AND RELATED RESEARCH NEEDS,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 06B.
W74-00004

KNOWLEDGE TRANSFER,
Utah State Univ., Logan. International Programs and Studies.
For primary bibliographic entry see Field 10A.
W74-00210

9D. Grants, Contracts, and Research Act Allotments

GEORGIA'S WATER PROBLEMS AND RELATED RESEARCH NEEDS,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 06B.
W74-00004

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

DEVELOPMENT AND PILOT-TESTING OF AN AUTOMATIC INFORMATION DISSEMINATION SYSTEM.
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 05D.
W74-00003

TRANSFER OF WATER RESOURCES KNOWLEDGE.

Proceedings of the 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado, E. Vlachos, Editor: Water Resources Publications, Fort Collins, 1973. 540 p.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

The conference on Transfer of Water Resource Knowledge used a two-fold approach to aspects of transfer: the transfer of knowledge from

developed to developing countries; and the transfer of knowledge from research to practice. The collection of papers raises major points about the overall process of communicating and transferring knowledge and about the important linking mechanisms between transmitters and receivers. More important, it points out important elements of the process such as the source, methods, channels, receiver, and short- and long-range effects of the communicated knowledge. Transfers of knowledge without any other major socioeconomic changes, without deep transformations in the social structure, and without the commitment of professionals to a wider horizon under the specific cultural conditions of each country and region will be exercises in futility, abortive transplants, and continuous sources of frustration for well meaning technologists. (See W74-00190 thru W74-00228) (Knapp-USGS)
W74-00189

ECONOMIC ANALYSIS AND MUNICIPAL WATER SUPPLY IN DEVELOPING COUNTRIES,
International Bank for Reconstruction and Development, Washington, D.C.
J. J. Warford, and P. W. Whitford.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972. Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 40-51, 1973. 2 ref.

Descriptors: *Information exchange, *Water supply, *Municipal water, *Water management (Applied), *Economics, Social aspects, Cost-benefit analysis, Legal aspects, Research and development, Cost-benefit theory, Technology.
Identifiers: *Technology transfer, *Developing countries.

Some of the difficulties involved in applying economic theory to the practical problems faced by municipal water supply authorities are discussed with particular reference to conditions in developing countries. Basic economic principles are so crucial and so relevant to this field that there is ample scope to adapt theory to suit the practical circumstances of the water-supply industry, and compromise solutions can be reached that are likely to yield considerable benefits. The problem is to use economics in a way that is palatable to the industry. Pricing and investment policies; principles and problems of implementing marginal cost pricing; the roles of benefit-cost analysis and shadow pricing in project design, selection, and construction; unemployment and acute foreign exchange problems that are typical of developing countries; and the political, institutional, and social barriers to the adoption of economically efficient pricing and investment rules are discussed. (See also W74-00189) (Knapp-USGS)
W74-00190

RESEARCH IMPLEMENTATION, A COORDINATED APPROACH,
Utah Water Research Lab., Logan.
J. M. Bagley, J. P. Riley, and D. F. Laurence.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 52-59, 1973. 1 fig.

Descriptors: *Information exchange, *Research and development, *Water resources, Planning, Universities, Research priorities, Technology, *Coordination.
Identifiers: *Technology transfer, *Information exchange.

Ideally, research and practice are linked by two-way information channels which convey research needs, or user problems, to the scientist and research knowledge to the user. Without well developed linkage channels, research programs tend to be fragmented and inconsistent with user needs, while users fail to apply currently available knowledge to meet the problems which they face. Some of the problems associated with the effective two-way flow of information between the research and practice regions and possible techniques for implementing this flow are discussed. Recommendations are given for the improvement of communication. There has apparently been a tendency in the past to treat research, practice, and linkage as independent entities rather than as an integrated system which provides for the effective flow of information within the system as a whole. (See also W74-00189) (Knapp-USGS)
W74-00191

WATER RESOURCES SCIENTIFIC AND TECHNICAL INFORMATION DISPLAY, STORAGE, AND RETRIEVAL,
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
R. A. Jensen.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 60-70, 1973. 5 fig, 4 ref.

Descriptors: *Abstracts, *Bibliographies, *Data processing, *Information exchange, Documentation, Data collections, Information retrieval, Federal Government, Research and development, Publications, Water resources institute, Water resources Research Act, Digital computers, Computer programs.
Identifiers: *Technology transfer, *Water Resources Scientific Information Center, Office of Water Resources Research.

Information storage and retrieval activities currently being conducted by the Water Resources Scientific Information Center of the Office of Water Resources Research in the U.S. Department of the Interior are described. University water resources research groups are used as input centers to convert information collected in performing their own research to a common format which, when merged, forms a comprehensive and searchable information base. The general information processing system (GIPSY) is used by the prototype network, with terminals at the University of Wisconsin, Cornell University, and The University of North Carolina. GIPSY is a search program plus a set of utility programs which operate in batch or tele-processing mode from remote terminals. GIPSY operates in the online reactive mode, and can be used for generating topical bibliographies. (See also W74-00189) (Knapp-USGS)
W74-00192

THE INFORMATION SCIENCE APPROACH TO TRANSFER OF KNOWLEDGE,
Bureau of Reclamation, Denver, Colo. Engineering Reference Branch.
W. B. McBirney.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 71-79, 1973.

Descriptors: *Abstracts, *Bibliographies, *Data processing, *Information exchange, Documentation, Data collections, Information retrieval, Federal Government, Research and development, Publications, Digital computers, Computer programs.
Identifiers: *Technology transfer, *Bureau of Reclamation, *Information science.

The information science approach to facilitating the transfer of knowledge is discussed in general terms. Use of abstract bulletins, selective dissemination of information, bibliographies, state-of-the-art reviews, microforms, and retrieval are reviewed. The operational scientific information program of the Bureau of Reclamation is described in its application of the computer for dissemination and retrieval. A brief view is given of feasible methods for providing scientific information to developing countries as compared to more modern societies. (See also W74-00189) (Knapp-USGS)
W74-00193

TRANSMITTING WATER RESOURCES INFORMATION BY A TIME-SHARE SYSTEM,
New Mexico State Univ., University Park.
C. G. Keyes, Jr., and R. T. Telfer.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 80-88, 1973. 5 fig, 5 ref. Bur. of Reclam. 14-06-D-6803.

Descriptors: *Abstracts, *Bibliographies, *Data processing, *Information exchange, Documentation, Data collections, Information retrieval, Federal government, Research and development, Publications, Digital computers, Computer programs.
Identifiers: *Technology transfer, Time-share computers.

A time-share computer system may be used to transmit water resources information. The basic system consists of a central processing unit, terminal locations, input data locations, and output data locations or users. The system could be expanded to include real-time forecasting or design in any atmospheric water resources program. (See also W74-00189) (Knapp-USGS)
W74-00194

DEVELOPING A COOPERATIVE RESEARCH PROGRAM FOR FLOOD CONTROL IN BRAHMAPUTRA VALLEY,
Brahmaputra Flood Control Commission (India).
S. N. Gupta.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 98-109, 1973. 3 fig.

Descriptors: *Information exchange, *Flood control, Floods, Model studies, Braiding, Mathematical models, Sediment transport.
Identifiers: *Technology transfer, *Assam.

The Brahmaputra River in the northeastern region of India causes flood and erosion problems. The Government of Assam created a Flood Control Commission in July 1970 to study flood problems of the valley and prepare a master plan for flood control. A comprehensive cooperative research program is being planned by Hydrology Directorate of Central Water and Power Commission, India, and Hydrology and Water Resources Wing of Colorado State University, Fort Collins, to study the problems. The availability of high speed computers of large capacity makes it possible to simulate the performance of relatively complex river basin systems for periods of any desired length. Design, construction, and operation of a mathematical model for Brahmaputra basin will provide a tool for the study of complex flood phenomena in the valley. It will also depict how

river training measures should be devised to least interfere with the channel regime and, at the same time, control bank erosion. Study of hydrology of Brahmaputra River is a suitable subject for cooperative research. (See also W74-00189) (Knapp-USGS)
W74-00195

APPLICATION OF HYDROGEOLOGICAL DATA TO LONG-TERM ECONOMICS OF GROWING SUGAR CANE IN VENEZUELA,
Water Development Corp., Tuscon, Ariz.
L. C. Halpenny, and A. Dupuy.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 110-115, 1973. 1 fig.

Descriptors: *Information exchange, *Irrigation practices, *Withdrawal, *Conjunctive use, Sugarcane, Economics, Water yield.
Identifiers: *Technology transfer, *Venezuela.

Transfer of hydrogeological knowledge from research to practice and from developed to developing regions has been successfully achieved beginning in 1959 under a cooperative effort between consulting hydrologists and sugar cane growers in Venezuela. The program was begun by Central El Palmar within the area drained by Rio Aragua in the State of Aragua, Venezuela. The area is intensively farmed with irrigated agriculture, of which a substantial portion is sugar cane. The water supply for irrigation is obtained partly from stored surface-water runoff and partly by pumping wells. The initial objective of the program was to detect changes in groundwater levels from which predictions could be developed as to whether or not the groundwater system was being overdeveloped. This early warning system indicated in 1962 that Tocoron subarea in Aragua State was being overdeveloped, and arrangements were made to reduce pumping and to divert more surface water to the area. Evaluation of water-supply data made it possible to refine the consumptive use calculations for planning future irrigations. Optimum cane yield results when 200 cubic meters of total water supply is available for each metric ton of cane produced. (See also W74-00189) (Knapp-USGS)
W74-00196

PUERTO RICO: A CASE STUDY OF WATER RESOURCE TECHNOLOGY TRANSFER,
Puerto Rico Dept. of Public Works, San Juan. Area of Natural Resources.
W. E. Nothdurft.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 116-124, 1973. 3 ref.

Descriptors: *Information exchange, *Water resources development, *Puerto Rico, Water management (Applied), Planning, Urbanization, Government, Social aspects, Political aspects, Flood protection, Dams, Reservoirs.
Identifiers: *Technology transfer.

The transfer of water resources knowledge from developed to developing areas involves transfers from point to point within a given system or institutional management structure, and transfers from some external source into a given system or institutional management structure. The theoretical framework of these transfers and the barriers to their efficient functioning in the water resource management institutional structure of one developing area, the Commonwealth of Puerto Rico, is discussed. Barriers, or inefficiencies, in intrasystem transfers are closely related to the level of managerial sophistication in the institutional structure. On the other hand, inefficiencies in intersystem transfers can generally be attributed to institutional inflexibility on the part of either the transfer recipient (as is generally the case), the transfer source, or both; and the incapacity of the recipient system to absorb new inputs. (See also W74-00189) (Knapp-USGS)
W74-00197

TRANSFER OF KNOWLEDGE IN WATER RESOURCES FROM RESEARCH TO PRACTICE,
European Economic Commission, Geneva (Switzerland). Environment Div.
A. D. Pobedimsky.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 125-131, 1973.

Descriptors: *Information exchange, *Europe, *United Nations, Conferences, Education, Water management (Applied), Research and development.
Identifiers: *Technology transfer.

The purpose is to describe how an international organization (the UN Economic Commission for Europe) transfers knowledge in the field of water resources from research to practice. Emphasis is placed on the pooling of international experience in the field of water resources development and water quality problems, on studies and seminars in this field, and on the transferring of national experience through systematic circulation of technical information. Suggestions are also offered as to the efficient transferral of knowledge by international organizations and the eventual use in national practices. (See also W74-00189) (Knapp-USGS)
W74-00198

THE ROLE OF THE INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE IN THE TRANSFER OF WATER RESOURCES KNOWLEDGE,
Bureau of Reclamation, Denver, Colo. Technical Services Branch.
L. D. Stephens.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 132-142, 1973.

Descriptors: *Information exchange, *Irrigation, *Drainage, Water management (Applied), International Commissions.
Identifiers: *Technology transfer, *International Commission on Irrigation and Drainage.

The International Commission on Irrigation and Drainage provides a forum for the development of the sciences and techniques of irrigation engineering, flood control, and river training. The role of the Commission in transferring water resources knowledge in these areas from research to practice and from developed to developing countries is discussed. Activities of the Commission are described, and currently available publications are summarized. (See also W74-00189) (Knapp-USGS)
W74-00199

HOW ENGINEERING RESEARCH IS REDUCED TO PRACTICE IN THE BUREAU OF RECLAMATION,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
H. J. Cohan, and W. P. Simmons.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 148-154, 1973.

Descriptors: *Research and development, *Information exchange, *Water resources development, Hydrology, Dams, Irrigation, Reservoirs.
Identifiers: *Bureau of Reclamation, *Technology transfer.

The Bureau of Reclamation and its activities, how research needs are identified, and how planning and engineering research is organized and carried out to satisfy those needs are described. How research results are transferred into practice is shown by case histories. The continuing search for improvements in ways of transferring research results into practice, and the present status of techniques being utilized are described. The importance of 2-way communication and feedback is stressed. (See also W74-00189) (Knapp-USGS)
W74-00200

RESEARCH FINDINGS AND THE DESIGN ENGINEER,
Auburn Univ., Ala.
C. H. Harrison.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 155-161, 1973. 5 ref.

Descriptors: *Information exchange, *Bibliographies, *Publications, *Engineering, Water resources development.
Identifiers: *Technology transfer.

An engineer with a design problem will attempt to locate information either by consultng a colleague or by reference to an index. The Cumulative Index to ASCE Publications is suggested as a good starting point. More recent research findings can often be obtained by phoning or writing the author of an article appearing in an ASCE journal or by contacting a researcher listed in the Water Resources Research Catalog. Where the Citation Index is available, more recent publications on a given subject can be quickly located by using ASCE publications as a starting point. Abstracts alone are of little value to a design engineer. The design engineer's need for immediate reference material places a large responsibility on the reviewers of the major technical journals. These reviewers should also pay attention to the quality of the reference supplied with a technical paper because of the increasing use of the Citation Index. (See also W74-00189) (Knapp-USGS)
W74-00201

TECHNICAL AID FOR HYDROLOGIC STUDIES IN SPANISH-SPEAKING COUNTRIES,
Geological Survey, Lakeland, Colo.
O. J. Taylor.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p. 162-166, 1973.

Descriptors: *Information exchange, *Foreign projects, Hydrology, Computer programs, Mathematical models, Hydrogeology.
Identifiers: *Technology transfer, *Chile, *Canary Islands.

Recent technical aid for hydrologic studies in Chile, the Canary Islands, and Spain emphasized the necessity for communication in various specialties. The projects included design and in-

terpretation of digital-computer simulation models for a stream-aquifer system in central Chile and preparation of computer programs for the processing of chemical data from the Canary Islands. The results of studies published by the various countries showed that the technical assistance was effective. The success of the technical aid was strongly dependent on communication with Spanish-speaking hydrologists in mathematics, computer science, hydrology, and related technologies. Failure to communicate in technical specialties may easily lead to misunderstanding of problems, misleading results, or completely erroneous results. (See also W74-00189) (Knapp-USGS)
W74-00202

THE ROLE OF PROFESSIONAL SOCIETIES IN THE DISSEMINATION OF WATER RESOURCES RESEARCH INFORMATION,
American Society of Civil Engineers, New York. Research services.
D. C. Taylor.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 167-185, 1973. 12 ref, 2 append.

Descriptors: *Information exchange, *Professional societies, *Technical societies, Publications, Conferences, Documentation, Abstracts, Information retrieval, Data collections.
Identifiers: *Technology transfer.

Professional societies, because of the nature of their membership, have a major role to play in the interpretation and dissemination of research information to their members for practical use. In few other ways are the members of the profession brought together so closely on technical and professional issues. Traditional methods of disseminating information by professional societies are still very effective and include conference symposia, technical magazines and journals, and meetings. There are also trends toward providing easier ways for busy professionals to locate and put to use relevant information such as the use of information storage and retrieval systems and publication of state of the art studies. Research-in-progress surveys and research needs studies help link research as well as make it relevant to practice. New and expanding continuing education services bring new information to members faster. (See also W74-00189) (Knapp-USGS)
W74-00203

THE WATER RESOURCES INFORMATION PROGRAM AT THE UNIVERSITY OF WISCONSIN,
Wisconsin Univ., Madison. Water Resources Center.
L. G. Zweifel, J. R. Luedtke, and J. E. Kerrigan.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 186-198, 1973.

Descriptors: *Wisconsin, *Abstracts, *Bibliographies, *Data processing, *Information exchange, Documentation, Data collections, Information retrieval, Federal Government, Research and development, Publications, Water resources institute, Water Resources Research Act, Digital computers, Computer programs.
Identifiers: *Technology transfer, *Water Resources Scientific Information Center.

The rapid growth of scientific information coupled with an increasing need to correlate diverse kinds of information in specialized research led to the development of information exchange and technology transfer systems. The establishment of the Water Resources Information Program at the University of Wisconsin was facilitated by the prior existence of several smaller information programs. These individual elements were consolidated to respond effectively to the needs of the information transfer activity. The information role of the Water Reources Center was expanded in 1968 when it was designated a center of competence in the field of eutrophication by the Water Resources Scientific Information Center of the Office of Water Resources Research. The Center identifies significant literature and submits abstracts for the OWRR'S semimonthly publication, Selected Water Resources Abstracts. The grant enables the information program to broaden its literature search capabilities, increase the number of abstracts, publish specific reviews of the literature, and distribute copies of abstracts to scientists and librarians throughout the world. A computer network provides terminal services to the water resources community in a 21-state western region for literature searches for technical and research projects. (See also W74-00189) (Knapp-USGS)
W74-00204

EUTROPHICATION RESEARCH APPLIED TO WATER QUALITY MANAGEMENT ON THE GREAT LAKES,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
A. R. LeFeuvre, and J. P. Bruce.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 199-210, 1973. 1 fig, 11 ref.

Descriptors: *Information exchange, *Eutrophication, *Great Lakes, Canada, International Joint Commission, Lake Erie, Lake Ontario, Data collections, Water quality control, Water management (Applied).
Identifiers: *Technology transfer.

The eutrophication control program and negotiation of the Great Lakes Water Quality Agreement are excellent examples of a situation in which research results were quickly and effectively used in development of public policies and had a profound impact on these policies. The ingredients of this successful and rapid transfer of research findings to action programs are (1) an effective mechanism to mobilize both scientific and management manpower, (2) a procedure for public and media involvement in formulation of recommendations, (3) governmental organizations that have research activities built into the management responsibility structure, and (4) a deliberate commitment of highly qualified manpower to help the transfer and conversion process. (See also W74-00189) (Knapp-USGS)
W74-00205

WATER RESOURCES DEVELOPMENT POLICIES AND TRANSFER OF KNOWLEDGE FROM DEVELOPED TO DEVELOPING COUNTRIES,
Tahal Consulting Engineering Ltd., Tel Aviv (Israel).
A. Wiener.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 237-245, 1973.

Descriptors: *Information exchange, *Foreign projects, *Water resources development, *Water management (Applied), International commissions, Irrigation.
Identifiers: *Technology transfer, *Developing countries.

A meaningful study of the transfer from developed to developing countries of information, know-how, and technology relating to water resources has to consider not merely water as an isolated resource, but the whole complementary complex that is relevant to its use. Water is either an infrastructural feature, as it is in community and many industrial water supplies, or a production input, as it is in irrigation or in the wet industries. In both modes of water use the transfer of information ought not be confined to the resources aspects alone, but should also include economic, social, institutional, and political aspects. For projects to be effective in developing countries, they would have to include not only the physical infrastructural features from projects in developed countries, but also the elements connected with overcoming the inadequacy of underdevelopment, such as the lack of capacity to spontaneously produce the necessary transformation relating to rural organization, motivation, and information transfer down to the production level. (See also W74-00189) (Knapp-USGS)
W74-00206

WATER RESOURCES UTILIZATION IN DEVELOPING COUNTRIES,
Universidad Central de Venezuela, Caracas.
L. E. Franceschi.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 246-251, 1973.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

Basically, a water plan for a developing country should provide the necessary foresight to the decision making process, so that decisions are made with an awareness of their consequences, under priority preferences for solving the multiple, interrelated problems to be encounted. This calls for identifying the problem areas associated with water; assessing water problems, water availability and related land use conflicts; and preparing a plan that considers several planning stages differing in detail and precision but within the same orientation scope. Planning the use of a scarce resource is a permanent and continuous process in which the master plan encompassing the other stages is the most important instrument for any developing country. To assess water associated problems and formulate the plan, the most important tool is the water balance which is used to make logical allocation of the available water among potential users of a hydrographic unit in which several basins may be grouped. (See also W74-00189) (Knapp-USGS)
W74-00207

OBSTACLES TO CONSIDERATION OF RESOURCES MANAGEMENT ALTERNATIVES: SOUTH ASIAN EXPERIENCE,
D. U. Hewapathirane, and G. F. White.
In: Transfer of Water Resources Knowledge; Procedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 252-261, 1973. 35 ref.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *Sri Lanka (Ceylon).

One of the principal reasons for ineffective water management measures in developing countries is the failure of planning agencies (both consulting firms and government offices) to give consideration to alternatives to conventional techniques. As a result, some works fail to meet their social goals or have the opposite effects, and the less conventional techniques are neglected. Experience with river management programs in Sri Lanka (Ceylon) and the Lower Mekong Basin illustrate these points. Failure stems in large part from the method of training professional personnel and from the rigid definition of administrative missions for government agencies. Neither of these conditions is susceptible to early or easy correction. However, it is likely that partial remedy could be obtained rather readily at low cost by a combination of two activities: (1) adoption of a criterion that examination of alternatives should be an integral part of review of project proposals by multilateral and bilateral financial agencies, and (2) short-term training for principal technical personnel. (See also W74-00189) (Knapp-USGS)
W74-00208

TRANSFER OF WATER RESOURCES KNOWLEDGE FROM DEVELOPED TO DEVELOPING REGIONS OF THE WORLD,
Engineering Science, Inc., Berkeley, Calif., and Engineering Science, Inc., McLean, Va. International Div.
F. L. Hotes.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 262-269, 1973.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

In working in developing countries, primarily in water resources and agricultural development, knowledge of specialized mechanical skills, as well as that of the physical and social sciences, must be transferred. The transfer process is not complete until the developing nation has an active, permanent reservoir of water resources knowledge. Examples are given of problems stemming from the attitudes and traditions of both expatriate experts and developing country nationals. Oversophisticated methods inapplicable in most developing countries should not be taught intensively. If methods are conceived with the aid of people in such countries and executed in the developing world as frequently as possible, they should produce better results. (See also W74-00189) (Knapp-USGS)
W74-00209

KNOWLEDGE TRANSFER,
Utah State Univ., Logan. International Programs and Studies.
B. H. Anderson.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 270-279, 1973.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

United States universities and colleges will be involved in the education of foreign students for some time. The mechanisms or techniques of knowledge transfer and the kinds of problems that impede the process are discussed. For universities wanting to accomodate the real needs of foreign students, ideas and innovations in training are discussed. Emphasis is given to special short courses which can provide excellent opportunities for practical training programs. Properly planned courses can provide excellent knowledge transfer opportunities. However, this raises the question of the excellent knowledge transfer opportunities. However, this raises the question of the role to be played by various agencies and suggests that a new mechanism be found allowing a more direct approach between institutions involved in knowledge transfer. (See also W74-00189) (Knapp-USGS)
W74-00210

A CASE ON TRANSFER OF KNOWLEDGE IN WATER RESOURCES SYSTEMS PLANNING FROM A DEVELOPED REGION TO A DEVELOPING ONE, AND FROM RESEARCH TO APPLICATION,
Chile Univ., Santiago. Faculty of Physical and Mathematical Sciences.
J. A. Poblete, and R. Harboe.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 280-293, 1973. 36 ref.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

A brief description of a process of transfer of knowledge from one region to another and from research to application in the area of Water Resources Systems Planning is given. This description is based on the experience gained by the Centro de Planeamiento (CEPLA), a center of applied research and teaching in planning and economics at the School of Engineering of the University of Chile (UCH), over a period of approximately 10 years. Two interuniversity programs, one between the Department of Civil Engineering of the Massachusetts Institute of Technology (MIT) and CEPLA, and the other from the Water Resources Planning Group at the University of California, Los Angeles, (UCLA) and CEPLA, are described. A prolonged professional working seminar and two applied research projects are discussed. These activities have been designed by CEPLA as a means of transfer of knowledge from research to application. A working seminar for professionals, extended over a prolonged period of time and organized at a university, is successful and is a neutral ground for discussion among specialists of the conflicting aspects which characterize the water resources problems. It also provides an opportunity to present to professionals some of the relevant applied research projects that are being developed at universities and foreign countries. Applied research projects and the training of professionals and students who participate as technical staff in those projects is a promising vehicle of transfer from research to application. (See also W74-00189) (Knapp-USGS)
W74-00211

RESEARCH AND EDUCATION FOR DEVELOPMENT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
M. L. Albertson, and M. T. Chaudhry.
In: Transfer of Water Resources Knowledge, Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 294-306, 1973. 3 fig, 18 ref.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

Progress in developing countries requires plans, programs, manpower, and institutional resources. Manpower and resources are the result of education, training, and experience, while the basic informational resources for plans and programs come from research and study. Literature on development should be expanded and made available to the people. Participation of people from the less developed countries should be increased. This means more students and participants in seminars and discussion groups. Documentary films of lectures of the outstanding professors on various topics related to development should be prepared and made available to students and working people. Stronger and more extensive links should be established between universities and development agencies. Programs of research should be initiated to study the sociology of the educated, to determine their value, attitudes, and difficulties as they reflect on the development process. A research program should be started, and education should be spread on establishing democratic developmental institutions, which should replace existing authoritative structures. (See also W74-00189) (Knapp-USGS)
W74-00212

VENEZUELAN EXPERIENCE ON THE TRANSFER OF KNOWLEDGE IN WATER RESOURCES ENGINEERING,
Universidad Central de Venezuela, Caracas.
J. N. Aceituno, and J. I. Sanabria.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 321-327, 1973. 1 fig, 1 tab.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspect, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *Venezuela.

The mechanics of transfer knowledge and the path followed in Venezuela were studied in order to bring out the difficulties of the actual system and search for recommendations which permit the increase of efficiency of such transfer. Subjects surveyed were engineers in some of the fields of hydraulic resources engineering. Experience from developed areas is the main source of information of engineers involved in project activities. Local experiences are mainly used by engineers working on planning of water resources. Information is generally obtained by means of books and journals of professional societies. The lowest-percentage path followed by the knowledge corresponds to a personal contact with members of research institutions and universities. Engineers involved in planning activities reported the nonapplication of some techniques because of the quality and range of data required. There is a trend among publications from developed areas to be more scientific than practical. Thus publications are becoming a limited source of information for developing areas due to the character of their specialized problems. A typical example is research in the fields of

scour; many laboratory studies have been realized, but few fields measurements are reported. Periodical meetings, seminars, and short courses are good means of making personal contacts and effecting interchange of knowledge. (See also W74-00189) (Knapp-USGS)
W74-00213

ACHIEVEMENTS OF INDIA IN THE FIELD OF WATER RESOURCES DEVELOPMENT,
Central Water and Power Commission, New Delhi (India).
S. K. Jain.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 328-333, 1973, 1 tab.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *India.

In assessing water resources and the efforts for planning in India, emphasis is placed not only on structures and design, but also on the management and operation of various projects. Knowledge gained through such organizations as the Water and Power Development Consultancy Services as well as a multitude of other state agencies can be made available to other developing nations and, thus, contribute to the needed continuous transferal of experience. (See also W74-00189) (Knapp-USGS)
W74-00214

EXPERIENCE OF THE U.S. GEOLOGICAL SURVEY IN TRANSFER OF HYDROLOGIC KNOWLEDGE TO THE DEVELOPING COUNTRIES,
Geological Survey, Washington, D.C. Office of International Activities.
G. C. Taylor, Jr.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 334-344, 1973. 4 tab.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *U.S. Geological Survey.

The U.S. Geological (USGS) has participated in overseas technical assistance programs for more than 30 years. Between 1940 and 1970 USGS water scientists and engineers completed 347 project oriented assignments in 80 host countries. During the same period 426 water scientists, engineers, and technicians from 61 countries received academic and inservice training through USGS facilities in the United States. Training is a basic ingredient of the institution building process. Technical competence, adaptability to host country constraints, and personal sympathy with host country needs and aims are important qualities in the USGS specialist on foreign assignment. Most important to successful technical assistance is the provision of qualified local individuals for training as well as leadership and administrative support. Continuity of relationship between the USGS and its host country counterpart has been found to be the single most important factor contributing to the growth of a viable water-resources organization over a period of years. (See also W74-00189) (Knapp-USGS)
W74-00215

SOME PROBLEMS ASSOCIATED WITH THE USE OF FOREIGN ADVISORS IN DEVELOPING COUNTRIES,
Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
W. W. Shaner.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 345-355, 1973.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

Many developing countries in the early stages of economic development and planning have to rely on foreign organizations and advisors. This reliance is likely to continue until sufficient time has lapsed to permit the country to develop its institutions and train its own specialists and administrators. However, making good use of foreign technology involves a number of problems, many of which are only discovered through living and working in such countries. These problems involve the promoters, the biased, the impossible, the irrelevant, the confusion, the out of place, the sophisticates, the vacationers, and the old timers. Better knowledge of these problems followed by appropriate action should lead to an easier and more efficient transfer of technology between the developed and the developing countries. (See also W74-00189) (Knapp-USGS)
W74-00216

TRANSFER OF KNOWLEDGE IN WATER RESOURCES FROM DEVELOPED TO DEVELOPING REGIONS WITH SPECIAL REFERENCE TO THE CONDITIONS OF WEST PAKISTAN,
Ministry of Finance, Planning and Development, Islamabad (Pakistan). Div. of Water Resources.
S. K. Malik.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 356-365, 1973. 1 fig, 2 tab.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *West Pakistan.

The main problems of water resources development in West Pakistan, especially the major works undertaken in the Indus River Basin, are discussed. In the context of these works the role of foreign advisers, consultants, and contractors from developed countries is discussed, and the successes and failures of such a cooperation are juxtaposed. From past experience proposals for the future include the acquainting of foreign experts with local circumstances, raising of the level of technical expertise, and a broader understanding of the socioeconomic million within which development takes place. (See also W74-00189) (Knapp-USGS)
W74-00217

DEVELOPMENT OF MATHEMATICAL MODELING CAPABILITIES FOR THE VISTULA RIVER PROJECT, POLAND,
Water Resources Engineers, Inc., Walnut Creek, Calif.
G. T. Orlob, I. P. King, and D. F. Kibler.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 384-392, 1973. 1 fig, 2 ref.

Descriptors: *Information exchange, *Mathematical models, *Systems analysis, *Water resources development, Water supply, Optimization, Education, Training.
Identifiers: *Technology transfer, *Poland.

Under sponsorship of the United Nations Development Program, Poland performed a study of alternative plans for the optimal utilization of the Vistula River System, the country's primary water resource. An important element of the study involved training of Polish engineers in mathematical modeling techniques already in use in the United States and the transfer of this knowledge through a working team to facilitate development and application of models in Poland. A high degree of rapport and mutual respect for technical competence of model team participants was developed. Substantial advances in the mathematical modeling art were made, especially in the development and refinement of the One-Step Water Resources Allocation Model, VISSIM. Other notable contributions were in the development of a versatile power optimization program by the Polish team and the initial application of a stream temperature model to the Vistula River System. As an exercise in the interchange of water resources planning knowledge, the experience was rewarding to all. (See also W74-00189) (Knapp-USGS)
W74-00218

METHODS OF TRANSFER OF WATER RESOURCES KNOWLEDGE FROM DEVELOPED TO DEVELOPING REGIONS WITH SPECIAL EMPHASIS TO ON-FARM WATER MANAGEMENT,
Agency for International Development, Washington, D.C. Office of Agriculture and Fisheries.
O. J. Kelley.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 393-406, 1973. 1 ref.

Descriptors: *Information exchange, *Planning, *Water resources development, *Farms, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data, Irrigation water, Groundwater, Soil water.
Identifiers: *Technology transfer, *Developing countries.

There is no single direct transfer of knowledge and technology from the developed to the developing country. In farm water management, the ultimate target of any knowledge transfer is the individual farmer, for it is on the farm land where the production resources are all integrated into an agricultural production system. In order to reach the farmer it is often necessary to train farm advisors, system operators, and administrators, and to develop production processes and institutions. Markets provide a direct contact with the farmer and are of great importance as a mechanism for knowledge transfer. Modern on-farm water management technology in developed countries is highly capital-intensive, highly energy intensive, and has a low labor requirement. In developing countries such as India and Pakistan, the energy simply is

not available; likewise capital is very scarce and labor is abundant. Modern systems which are fully automatic would, therefore, have only limited application in such countries. A particular advantage of modern water technology is the advantage of the built-in decisions that a well designed system has for correct water application. A well designed modern system has a considerable amount of management built into it, and the farmer is automatically led to the correct decision in the application of water to his land. (See also W74-00189) (Knapp-USGS)
W74-00219

GUIDELINES FOR TRANSFER OF PRACTICE TO APPLICATIONS FOR OPTIMUM ON PLANNING OF KEY ITEMS OF WATER RESOURCE PROJECTS,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
D. R. Sikka.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Knowledge, Fort Collins, p 407-413, 1973.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries.

In water projects in developing countries, the greatest bottleneck is the absence of an overall body for investigating, planning, construction, and management. Free flow and exchange of useful scientific data between private and public organizations rather than compartmentalization is also essential. It is desirable to prescribe suitable norms and criteria for a program of transfer of knowledge on Water Resources Projects. There is urgent need for international standardization of data from the practical and construction point of view. The classification, if done by collecting data on all the sizable dams constructed all over the world, would allow useful knowledge derived from practical results to be diverted for use elsewhere. (See also W74-00189) (Knapp-USGS)
W74-00220

NEW FRONTIERS IN DRAINAGE AND RECLAMATION ENGINEERING IN THE INDUS PLAINS,
S. K. Mohiuddin Khan.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 414-422, 1973. 5 ref.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *West Pakistan.

Drainage and reclamation in West Pakistan involve transfer of knowledge not only from developed countries to developing countries but also from research and local experience to practical implementation in the last two to three decades. Greater success in transfer of knowledge would have been facilitated by adopting intimate association with local experts who know the area and problems, and proper check on consultants of foreign aided projects; restriction on large scale transfer of sophisticated techniques of developed countries to developing countries without thorough analysis of all technical and socioeconomic aspects; seminars and symposia at different stages of investigation planning, project preparation, operation and maintenance; and more thorough post project monitoring and evaluation. (See also W74-00189) (Knapp-USGS)
W74-00221

AN IHD PROJECT FOR TECHNOLOGY TRANSFER TO DEVELOPING REGIONS,
Hydrologic Engineering Center, Davis, Calif.
E. F. Hawkins.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 438-448, 1973. 2 tab, 5 ref.

Descriptors: *Water resources development, *Information transfer, *Training, Management, Statistical methods, Mathematical studies, Mathematical models, Hydrology, Conferences, *International Hydrological Decade.
Identifiers: *Technology transfer, *U.S. Army Corps of Engineers.

As part of the United States program for the International Hydrologic Decade (IHD), the U.S. Army Corps of Engineers developed a project entitled Hydrologic Engineering Methods for Water Resources Development. The objectives of the project are to develop and test methods suitable for practical applications in hydrologic engineering and to document these methods in a report. Special attention is given to circumstances under which there are deficiencies in the length, accuracy, and general coverage of hydrologic records. A workshop was given to provide engineers engaged in day-to-day planning, design, and operation of water resources projects with a thorough understanding of the application of a comprehensive variety of hydrologic engineering techniques. The workshop is divided into four major areas: (1) fundamental considerations in water resources development; (2) statistical and mathematical techniques for hydrologic engineers; (3) analysis of natural hydrologic systems; and (4) analysis of water resources development. (See also W74-00189) (Knapp-USGS)
W74-00222

THE ROLE OF FAO IN THE TRANSFER OF WATER RESOURCES KNOWLEDGE TO DEVELOPING REGIONS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Land and Water Development Div.
H. W. Underhill, R. G. Thomas, and D. Salomons.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 449-461, 1973. append.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologica data.
Identifiers: *Technology transfer, *Developing countries, *Food and Agricultural Organization (UN).

The transfer of knowledge is not an end in itself; the end is to benefit mankind. This benefit will only be achieved if the knowledge is suitable, is adequately transmitted to a well motivated recipient, and is correctly applied. Every situation demands a different solution. FAO has wide experience in this sphere. The transfer of knowledge of the right kind and at the right level to be immediately absorbed and applied is the key to development. The choice and preparation of the individuals--those who are to transmit, and those who are to receive and apply the knowledge--are crucial. (See also W74-00189) (Knapp-USGS)
W74-00223

TECHNICAL ACTIVITIES BY FAO IN THE TRANSFER OF WATER RESOURCES KNOWLEDGE TO DEVELOPING REGIONS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Land and Water Development Div.
C. E. Houston, and H. M. Horning.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 462-472, 1973. 1 fig, 7 ref.

Descriptors: *Information exchange, Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *Food and Agricultural Organization (UN).

Water must be studied, developed, and used as a single resource. Technical manpower for study and development of water resources in many developing countries is of a high caliber, but as with many developed countries the utilization of the end project is the gap leading to success or failure. FAO is attempting to fill that gap through field projects, seminars, and publications. The first step in this process is to create an awareness with Governments, then with Technical Services, and finally with the water users. The success or failure of the end user determines the success or failure of an irrigation project, not the engineering design and construction. (See also W74-00189) (Knapp-USGS)
W74-00224

TRANSFER OF KNOWLEDGE IN WATER RESOURCES POLICIES FROM DEVELOPED TO DEVELOPING COUNTRIES,
United Nations Water Resources Development Center, New York.
K. Szesztay.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 473-479, 1973. 9 ref, append.

Descriptors: *Information exchange, *Planning, *Water resources development, *Water policy, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *United Nations.

There are well developed forms and channels for transferring scientific and technological knowledge in the field of water management. Fields and types of knowledge in which transfer and assistance may be needed depend largely on projected demands and strategies for water resources development and management. Policy formulation is itself, therefore, an important field for consideration by the conference. Possibilities and limitations for transferring knowledge in this sector are discussed in the light of recent United Nations experiences and programs. The selection of the proper level of technology corresponding to future investment capabilities and manpower resources is particularly emphasized. (See also W74-00189) (Knapp-USGS)
W74-00225

TRANSFER OF WATER RESOURCES KNOWLEDGE THROUGH THE UNITED NATIONS TECHNICAL ASSISTANCE ACTIVITIES,
United Nations Water Resources Development Center, New York.
R. E. Dijon.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 480-493, 1973. 1 append.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, Developing countries, *United Nations.

The United Nations provides technical assistance in the field of water resources to many developing countries, especially as an Executing Agency of the United Nations Development Program. Training is provided on an on-the-job basis, as well as through fellowships abroad. Local national conditions have to be considered; what is relevant for temperate regions does not necessarily apply to tropical areas. First priority is to be given to projects which can lead, within a short period of time, to practical results. The human factor is essential; training programs should be adapted to the academic and professional background of the local personnel. More should be done for the dissemination and exchange of information, not only from developed regions to developing regions, but also on a broad regional and international basis. (See also W74-00189) (Knapp-USGS)
W74-00226

RECENT DEVELOPMENT OF HYDROLOGICAL SERVICES IN COLOMBIA,
World Meteorological Organization, Bogota (Colombia).
W. Klohn, and S. Stanescu.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 494-504, 1973. 4 fig, 16 ref.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *Colombia.

Hydrological investigation was limited in Colombia until 1968 when a national hydrological and meteorological service was started as a joint project of the Colombian Government, the World Meteorological Organization, and the United Nations Development Program. Technical assistance in hydrology offered by an international team of experts was directed mainly towards hydrometrical network design and construction of the stations, personnel training on hydrological techniques, and introduction of procedures for data collection, processing, analyzing and interpretation. This is a typical case of transfer of knowledge from developed regions to a developing country. However, knowledge was not transferred uncritically but screened for applicability under the specific local conditions. The use of digital recorders was rejected. For the Colombian network, long-range strip-chart recorders were selected as the most suitable type. The relationship between the hydrological regime and the physical characteristics of the basins was useful. Because Colombian land use is changing rapidly from forest to cattle raising and agriculture, the hydrological regime of most rivers is changing towards more extreme flood peaks and low waters. Therefore, theoretical frequency is not applicable indiscriminately, and graphical empirical methods offer definite advantages. (See also W74-00189) (Knapp-USGS)
W74-00227

TRANSFER OF WATER RESOURCES KNOWLEDGE ASPECTS OF THE WORK OF THE UNITED NATIONS SYSTEM,
United Nations Educational, Scientific and Cultural Organization, Paris (France). Office of Hydrology.
F. H. Verhoog.
In: Transfer of Water Resources Knowledge; Proceedings of 1st International Conference on Transfer of Water Resources Knowledge, September 1972, Fort Collins, Colorado: Water Resources Publications, Fort Collins, p 505-514, 1973. 4 ref.

Descriptors: *Information exchange, *Planning, *Water resources development, Water management (Applied), Irrigation, Economics, Social aspects, Political aspects, Data collections, Hydrologic data.
Identifiers: *Technology transfer, *Developing countries, *United Nations.

The work of the United Nations system in the transfer of water resources knowledge is described with emphasis on Unesco's role. The Agencies of the United Nations System put considerable effort into the transfer of knowledge from the developed to the developing countries. The volume, expressed in dollars, spent by United Nations on water resources knowledge transfer is only a fraction of the total world volume; therefore, United Nations effort is especially directed towards incentive action and assistance in planning. A country can promote the inflow of knowledge by one or a combination of the following: purchase of complete solutions, procedures, equipment, and manpower without any national scientific effort; recruitment of foreign specialists to teach and train nationals; sending nationals abroad to obtain the required knowledge; and procurement of published information from one or more developed countries. In addition to the training component inherent in every project, there is the idea that national and foreign experts work closely together. This seems to be the best way to transfer technology because all factors needed for success are available. After training abroad the national engineers are, if necessary, given an interesting job in their own country together with a foreign expert from whom they can learn everything necessary. (See also W74-00189) (Knapp-USGS)
W74-00228

10F. Preparation of Reviews

MERCURY: ENVIRONMENTAL CONSIDERATIONS, PART I,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 05C.
W74-00292

WATER RESOURCES SUMMARY, ISLAND OF HAWAII,
Geological Survey, Honolulu, Hawaii.
For primary bibliographic entry see Field 02E.
W74-00355

NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05B.
W74-00402

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- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

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VOLUME 7, NUMBER 2
JANUARY 15, 1974

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VOLUME 7, NUMBER 2
JANUARY 15, 1974

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
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06 WATER RESOURCES PLANNING
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1A. Properties

ISOTOPE EFFECT AND THE MOLECULAR MECHANISM OF THE SECOND VISCOSITY COEFFICIENT OF WATER,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
E. McLaughlin.
Journal of Physical Chemistry, Vol 77, No 14, p 1801-1802, July 5, 1973. 1 fig, 1 tab, 10 ref.

Descriptors: *Water properties, *Viscosity, *Mathematical studies, *Mass transfer, *Isotope studies, *Heavy water, *Fluid mechanics, *Rheology, Viscous flow, Sound waves, Thermal conductivity, Theoretical analysis, Statistical methods, Shear.

In formulating statistical theories of transport process in liquids, information is needed on the molecular mechanism of transport. Such information can be obtained by studying the transport behavior of isotopic molecules in which masses and inertial moments can be altered without significantly affecting the parameters of the intermolecular potential. This method, which was used earlier to investigate shear viscosity and thermal conductivity, is applied to the examination of molecular mechanisms in the viscous processes determining the second viscosity coefficients of water. Appropriate sound-absorption data in ordinary and heavy water (deuterium oxide) are analyzed to derive the second viscosity coefficient. (Brown-IPC)
W74-00770

02. WATER CYCLE

2A. General

A METHODOLOGY FOR ASSESSMENT OF WATER RESOURCES DEVELOPMENT: A COMPETITIVE EVALUATION MODEL FOR WATER RESOURCES DEVELOPMENT PLANNING,
Oklahoma Univ., Norman. Bureau of Water Resources Research.
For primary bibliographic entry see Field 06B.
W74-00559

BIOTA OF FRESHWATER ECOSYSTEMS IDENTIFICATION MANUAL NO. 11 FRESHWATER UNIONACEAN CLAMS (MOLLUSCA:PELECYPODA) OF NORTH AMERICA,
Michigan Univ., Ann Arbor. Dept. of Zoology.
J. B. Burch.
Copy available from GPO Sup Doc as EP1.16:18050 ELD 03/73, $4.10; microfiche from NTIS as PB-224 831, $1.45. Environmental Protection Agency, Water Pollution Control Research Series, March 1973. 176 p, 154 fig, 71 ref. EPA Project 18050 ELD 03/73.

Descriptors: *Aquatic fauna, *Mollusks, *Pelecypods, *Mussels, Distribution, *North America, Data collections, *Biota.
Identifiers: *Identification manual, Illustrated key, *Unionacea, Species list.

Bivalved mollusks of the superfamily Unionacea (Order Schizodonta) are represented in North America by three families, 46 genera, and, as treated in this key, 221 species. The primitive Margaritiferidae are represented by two genera and four species, the Amblemidae by eight genera and 25 species, and the very large family Unionidae by 36 genera and 192 species. Systematics are not well worked out in many groups, which makes a definitive listing of species somewhat arbitrary at this time. The present key in most instances reflects a conservative approach to the lower taxa and, although it omits many nominal species of doubtful validity, the key nevertheless represents most of the biological species. Characters of soft anatomy are used to separate the families, subfamilies and, in a few cases, genera. Species are separated by shell characters. The main feature of this publication is an illustrated taxonomic key using both soft anatomy and shell characters for the identification of the North American Unionacea. (See also W73-13736 thru W73-13744, and W74-00563) (EPA)
W74-00564

SURFACE-GROUNDWATER RELATIONSHIPS ON THE EASTERN DNIESTER LEFT BANK (O VZAIMOSVYAZI POVERKHNOSTNYKH I PODZEMNYKH VOD NA VOSTOKE LEVOBEREZHNOGO PODNESTROV'YA),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
N. I. Drozd, and K. A. Lysenko.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 131-138, Moscow, 1971. 2 fig, 3 tab, 1 ref.

Descriptors: *Surface-groundwater relationships, *Rainfall-runoff relationships, *Streams, Recharge, Aquifers, Inflow, Hydrologic budget, Gaging stations, On-site investigations.
Identifiers: *Dniester River (USSR).

Computations of groundwater inflow to streams in the eastern Podolia Region from Ushitsa in the west to Kamenka and Beloche in the east were based on hydrologic observations by a network of gaging stations in 1946-65 and on on-site investigations by the Ukrainian Hydrometeorological Scientific Research Institute in 1967-68 and 1970. A gradual and steady increase in average monthly groundwater contribution to flow in the Batyg River at Zamekhov village ranging from 6 to 10 mm in 1949 and from 8 to 11 mm in in 1950 indicates a considerable lag in groundwater response to precipitation, i.e., a presence of large storage capacities in the principal aquifers discharging into the stream. Annual runoff and precipitation in 1947-65 and monthly runoff depths and precipitation in 1949-50 are tabulated for the river and bimonthly variations in precipitation and runoff of the river in 1949-50 are graphed. (See also W74-00592) (Josefson-USGS)
W74-00601

PREDICTION OF AIR TEMPERATURE AT A REMOTE SITE FROM OFFICIAL WEATHER STATION RECORDS,
Forest Service (USDA), Fort Collings, Colo. Rocky Mountain Forest and Range Experiment Station.
R. E. Campbell.
USDA Forest Serv. Res. Note RM-223, 1972. 4 p, 3 fig, 2 tab, 5 ref.

Descriptors: *Air temperature, Semiarid climates, Remote sensing, Meteorological data, Synoptic analysis, Weather patterns, Weather data, *Weather forecasing, Watershed management, *New Mexico.
Identifiers: *Temperature forecasting.

Air temperatures at the San Luis experimental watershed were predicted from temperatures at Albuquerque, New Mexico, on the basis of linear regressions between temperatures at the two locations calculated from a full year of continuous record at San Luis and official 3-hour records at Albuquerque. Hourly temperatures were predicted within plus or minus 6.3 to 7.8F., depending on time of day. Predictions of daily mean temperatures at San Luis were within plus or minus 3.8F. Monthly mean temperatures for a given time of day were predicted within plus or minus 3.6 to 5.5F. (Forest Service)
W74-00692

VARIABILITY OF ANNUAL RUNOFF AND PRECIPITATION VALUES (OB IZMENCHIVOSTI GODOVYKH VELICHIN STOKA I OSADKOV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 04A.
W74-00844

CONSIDERATION OF THE CHARACTER OF SURFACE-GROUNDWATER RELATIONSHIPS AND STREAMFLOW IN ESTIMATES OF YIELDS FROM INFILTRATION GALLERIES (UCHET KHARAKTERA SVYAZI PODZEMNYKH VOD S POVERKHNOSTNYMI I REZHIMA RECHNOGO STOKA PRI RASCHETAKH INF IL'TRATSIONNYKH VODOZABOROV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 08A.
W74-00848

SYSTEMS ENGINEERING APPROACH,
Texas Water Development Board, Austin. Systems Engineering Div.
For primary bibliographic entry see Field 06A.
W74-00940

DEVELOPMENT OF A SNOWMELT-RUNOFF MODEL FOR THE U.S. TUNDRA BIOME, PROGRESS REPORT,
For primary bibliographic entry see Field 02C.
W74-01094

2B. Precipitation

SNOW FENCES FOR INFLUENCING SNOW ACCUMULATION,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02C.
W74-00684

WEATHER CONDITIONS THAT DETERMINE SNOW TRANSPORT DISTANCES AT A SITE IN WYOMING,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02C.
W74-00685

PREDICTION OF AIR TEMPERATURE AT A REMOTE SITE FROM OFFICIAL WEATHER STATION RECORDS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02A.
W74-00692

A COMPILATION OF STUDIES FROM ATMOSPHERIC VARIABILITY EXPERIMENT (AVE),
Texas A and M Univ., College Station. Dept. of Meteorology.
J. R. Scoggins, H. E. Fuelberg, R. D. Carlson, R. W. Phelps, and D. G. Bellue.
Available from NTIS, Springfield, Va 22151 as NASA CR-2304 Price $3.00 printed copy; $1.45 microfiche. National Aeronautics and Space Administration Contractor Report NASA CR-2304, August 1973. 192 p. NASA Contract NAS 8-26751.

Descriptors: *Meteorology, *Weather forecasting, *Southeast U.S., *Atmospheric physics, Data collections, Methodology, Air temperature, Rainfall, Winds, Wind velocity, Air circulation, Kinetics, Movement, Air masses, Weather patterns, Climatic data, Orography, Synoptic analysis, Correlation analysis, Satellites (Artificial).
Identifiers: *Atmospheric variability, Spacecraft, Aerospace technology, Rawinsonde data.

The importance of meteorological systems too small to be detected and analyzed from upper-air synoptic data taken at 12-hr intervals in local weather forecasts and variability of parameters such as wind, temperature, and stability, has long been recognized. Because of the importance of subsynoptic-scale phenomena in the design and operation of space vehicles and the need for a better understanding of these phenomena, the Aerospace Environment Division of NASA's Marshall Space Flight Center carried out a measurement program during the period February 19-22, 1964. Rawinsonde soundings were made at 30 stations over the eastern part of the United States south of the Great Lakes. Soundings were made at intervals of 3 hours at all stations except Huntsville, Alabama and Mississippi Test Facility (near New Orleans), where soundings were made at intervals of 1.5 hours. This is known as the Atmospheric Variability Experiment I (AVE I). Four studies conducted at Texas A and M University under NASA Contract, using the AVE I data, are described. (See also W74-00852 thru W74-00855) (Woodard-USGS)
W74-00851

A STUDY OF WINTER PRECIPITATION AREAS IN RELATION TO SEVERAL INDICATORS OF VERTICAL MOTION--CHAPTER I OF A COMPILATION OF STUDIES FROM ATMOSPHERIC VARIABILITY EXPERIMENT (AVE),
Texas A and M Univ., College Station. Dept. of Meteorology.
H. E. Fuelberg.
In: National Aeronautics and Space Administration Contractor Report NASA CR-2304, p 3-58, August 1973. 25 fig, 27 tab, 25 ref. NASA Contract NAS8-26751.

Descriptors: * Meteorology, *Rainfall, *Southeast U.S., *Weather forecasting, *Atmospheric physics, Air circulation, Meteorological data, Data collection, Methodology, Air masses, Advection, Weather patterns, Air temperature, Climatic data, Orography, Kinetics, Winds, Wind velocity, Synoptic analysis, Cloud physics, Satellites (Artificial), Correlation analysis.
Identifiers: *Atmospheric variability, Vertical motion, Orographic lifting, Omega equation, Vorticity equation, Aerospace technology.

Five methods for obtaining the sign of vertical motion at various levels in the atmosphere were investigated to determine which gave the best explanation for areas of rain and no rain in the southeastern United States during the period February 19-22, 1964. The methods used were the terrain-induced vertical motion, the kinematic method including the terrain effect, the adiabatic methods, the omega equation, and the vorticity equation combined with Dines' Compensation Principle. Orographic lifting was an important factor in producing the observed precipitation; 63% of the occurrence of rain and no rain at 130 data collection points was explained by terrain-induced vertical motion alone. Values of vertical motion obtained by the kinematic methods, including orographic lifting at 850 mb, produced the best agreement with observed areas; 80.8% of the data collection points were explained correctly. Various forms of the adiabatic method gave results for the 700-500-mb layer that explained about 72% of the points. The vorticity equation produced results at all levels that verified only about 50% of the time. When terms in the omega equation were added through use of constant multipliers, results comparable to the adiabatic method were obtained. Without this addition large uncertainties occurred. Maps showing areas where terms of the omega equation would indicate positive vertical motion did not correlate well with the observed rainfall patterns. (See also W74-00851) (Woodard-USGS)
W74-00852

TIME CHANGES IN GRADIENT AND OBSERVED WINDS--CHAPTER II OF A COMPILATION OF STUDIES FROM ATMOSPHERIC VARIABILITY EXPERIMENT (AVE),
Texas A and M Univ., College Station. Dept. of Meteorology.
R. D. Carlson.
In: National Aeronautics and Space Administration Contractor Report NASA CR-2304, p 59-121, August 1973. 26 fig, 4 tab, 29 ref, 3 append. NASA Contract NAS8-26751.

Descriptors: *Meteorology, *Weather forecasting, *Southeast U.S., *Atmospheric physics, *Wind velocity, Data collections, Methodology, Weather patterns, Climatic data, Meteorological data, Orography, Air circulation, Kinetics, Synoptic analysis, Satellites (Artificial).
Identifiers: *Atmospheric variability, Gradient wind speed, Aerospace technology.

With the advent of air travel, the space age, and numerical weather prediction, wind and its variability at all levels in the atmosphere have become important. Local time changes of the observed and gradient wind speeds were examined at 500 mb for 3-, 6-, and 12-hour time intervals. The correlation coefficients between the changes in the two wind speeds over 3 and 6 hours are statistically not significantly different from zero at the 5% level. For the two 12-hour time intervals studied, the correlation coefficients between the local time changes in the two wind speeds were 0.38 and 0.51 which were statistically significant at the 5% level. A qualitative examination of the 3-, 6-, and 12-hour change of the components of the observed and gradient wind speeds also showed poor results over 3 and 6 hours with improvements over 12 hours. Although the gradient wind speed is generally an acceptable approximation to the actual wind speed, the results of this investigation show that the changes in the gradient wind speed are a poor approximation to changes in the actual wind speed over 3- and 6-hour time intervals, with some improvement over 12-hour intervals. (See also W74-00851) (Woodard-USGS)
W74-00853

AN ANALYSIS OF INTERNAL ZONES OF DISCONTINUITY--CHAPTER III OF A COMPILATION OF STUDIES FROM ATMOSPHERIC VARIABILITY EXPERIMENT (AVE),
Texas A and M Univ., College Station. Dept. of Meteorology.
D. G. Bellue.
In: National Aeronautics and Space Administration Contractor Report NASA CR-2304, p 123-161, August 1973. 24 fig, 16 ref, append. NASA Contract NAS 8-26751.

Descriptors: *Meteorology, *Weather forecasting, *Southeast U.S., *Cyclones, Air temperature, Rainfall, Data collections, Methodology, Air masses, Weather patterns, Fronts (Atmospheric), Air circulation, Atmospheric physics, Kinetics, Satellites (Artificial), Correlation analysis, Synoptic analysis, Precipitation (Atmospheric).
Identifiers: *Atmospheric variability, Internal zones of discontinuity, Rawinsonde data, Aerospace technology.

Internal zones of discontinuity were investigated which resulted when an open wave in the Gulf of Mexico developed into an east coast cyclone on February 19, 1964. Cross sections of equivalent potential temperature were employed in the location of these zones, which were delineated on the basis of strong equivalent potential temperature gradients. Processes which caused variations in these zones with time were investigated by use of the frontogenetic function. The x- and z-component equations of this function were evaluated term-by-term and compared with the observed conditions in the cross sections of equivalent potential temperature. The results indicated that regions of intense frontogenesis were associated with strong gradients of equivalent potential temperature within the zones of discontinuity, and regions of intense frontolysis were associated with weak gradients. Also, changes in the slope of the discontinuities were associated with frontolytic/frontogenetic regions. The relationship between these changes in slope and changes in the precipitation patterns was examined, and a close association was found. Finally, the usefulness of the frontogenetic function in the study of the zones of discontinuity was pointed out, and the need was emphasized for more frequent and more accurate rawinsonde data. (See also W74-00851) (Woodard-USGS)
W74-00854

AN APPROACH TO THE DETERMINATION OF THE VARIABILITY OF WIND THROUGH THE USE OF QUASI-CONSERVATIVE THICKNESS FIELDS--CHAPTER IV OF A COMPILATION OF STUDIES FROM ATMOSPHERIC VARIABILITY EXPERIMENT (AVE),
Texas A and M Univ., College Station. Dept. of Meteorology.
J. R. Scoggins, and R. W. Phelps.
In: National Aeronautics and Space Administration Contractor Report NASA CR-2304, p 163-192, August 1973. 9 fig, 3 ref, 2 append. NASA Contract NAS8-26751.

Descriptors: *Meteorology, *Weather forecasting, *Southeast U.S., *Atmospheric physics, *Winds, Data collections, Wind velocity, Wind pressure, Air temperature, Boundary layers, Correlation analysis, Air masses, Air circulation, Kinetics, Satellites (Artificial).
Identifiers: *Atmospheric variability, *Quasi-conservative thickness fields, Aerospace technology.

Atmospheric Variability Experiment (AVE) data are analyzed for February 19-20, 1964, to relate changes in measured wind on selected constant-pressure surfaces to changes in the thermal wind for a layer below the constant-pressure surface. Layers of various thicknesses are considered with the base of 950 mb, and others with bases at higher levels. The tops of the layers ranged from 700 to 300 mb. With the assumption of constant wind direction with height, areas with changes in the measured wind at the top of a layer and changes in the thermal wind within the layer less than or equal to 5m/sec coincided closely for thick layers and time intervals exceeding about 6 hrs. The linear correlation coefficient between changes in the measured and thermal winds less than or equal to 5 m/sec (positive or negative) was positive and significantly different from zero at the 5% level. Changes over periods of 3, 6, 9, and 12 hrs were considered in the analysis. (See also W74-00851) (Woodard-USGS)
W74-00855

CURRENT STATUS OF RESEARCH ON THE BIOLOGICAL EFFECTS OF PESTICIDES IN CHESAPEAKE BAY,
Westinghouse Ocean Research Lab., Annapolis, Md.
For primary bibliographic entry see Field 02L.
W74-00923

THE INFLUENCE OF METEOROLOGICAL ELEMENTS ON THE ANNUAL RHYTHM OF HEIGHT GROWTH IN PINES, (IN GERMAN),
Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Eberswalde (East Germany). Institut fuer Forstwissenschaften.

For primary bibliographic entry see Field 02I.
W74-01077

2C. Snow, Ice, and Frost

ICINGS DEVELOPED FROM SURFACE WATER AND GROUND WATER,
Regions Research and Engineering Lab. Hanover, N.H. Cold Regions Research and Engineering Lab.
K. L. Carey.
Cold Regions Science and Engineering Monograph III-D3, May 1973. 65 p, 37 fig, 80 ref. Contract DA 4A062112A894.

Descriptors: *Ice, Highway icing, Ice cover, Cold regions, Surface-groundwater relationships, Freezing, Thawing, Permafrost.
Identifiers: *Icings, *Naleds.

Existing knowledge of the occurrence, control, and prevention of icings is summarized. A brief history of icing studies, general descriptions of icings, engineering significance of icings, origins of icings and factors affecting icing formation, techniques for studying icings, techniques for counteracting icings, avoiding icing problems in new construction, and a selected bibliography are included. Icings which are developed from surface water and groundwater can occur either naturally or as a result of man's activities in the cold regions. Thus the icing phenomenon occupies the unusual position of being either a product of the physical environment, or an inadvertently introduced and potentially disruptive influence in the environment. (Knapp-USGS)
W74-00581

PROBLEM OF SIMPLIFYING SNOWMELT COMPUTATIONS (K VOPROSU OB UPROSHCHENNOM RASCHETE SNEGOTAYANIYA),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
V. A. Romanenko.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 42-47, Moscow, 1971. 2 fig, 2 tab, 8 ref.

Descriptors: Analytical techniques, *Snowmelt, *Melting, *Runoff, Water storage, Air temperature, Methodology.
Identifiers: USSR.

Despite snowmelt computation methods based on solution of the heat-balance equation of melting snow, the application of temperature coefficients of snowmelt for simplified mass computations is valid and expedient. A method is presented for determining snowmelt coefficients from integral curves of the relation between loss in snow storage in areas of simultaneous snowmelt and air temperatures. The method can be used to determine the temperature coefficient of snowmelt as the tangent of the angle of inclination of the line to the snow-storage temperature axis. (See also W74-00592) (Josefson-USGS)
W74-00596

EFFECT OF FOREST COVER REMOVAL ON DEPTH OF SOIL FREEZING AND OVERLAND FLOW,
Forest Service (USDA), La Crosse, Wisc. Watershed Lab.
For primary bibliographic entry see Field 02G.
W74-00610

SAMPLING REQUIREMENTS FOR AREAL WATER EQUIVALENT ESTIMATES IN FORESTED SUBALPINE WATERSHEDS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00675

AVALANCHES IN OUR WESTERN MOUNTAINS: WHAT ARE WE DOING ABOUT THEM,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
K. Williams.
Weatherwise, Vol 25, No 5, p 220-227, 1972.

Descriptors: *Avalanches, Disasters, Meteorology, *Snow, *Storms, Synoptic analysis, Weather patterns, *Washington.
Identifiers: Avalanche research, Avalanche zoning, *Cascades (Wash).

Two snow storms which produced major avalanche cycles in Washington's Cascades are studied in detail. Approximately 850 avalanches were recorded during these storms, resulting in loss of life and property. The meteorological features of these storms are examined. The various ways in which the avalanche problem is being handled are discussed. These include special weather forecasts and avalanche warnings, the National Avalanche School, avalanche control measures, protective structures, avalanche zoning, and avalanche research. (Forest Service)
W74-00680

A CENTRIFUGAL TENSILE TESTER FOR SNOW,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. A. Sommerfeld, and F. Wolfe, Jr.
USDA Forest Service Research Note RM-227, 1972. 4 p, 3 fig, 6 ref.

Descriptors: *Avalanches, *Snow management, *Tensile strength, Centrifugation, Stress.
Identifiers: *Snow avalanches.

A new centrifugal tensile tester has been designed for snow samples. The design incorporates the following unique features: constant stress rate, automatic turnoff, strip chart record of RPM, variable sample volume, and reduced sample damage. (Forest Service)
W74-00682

SIMULATED SONIC BOOM AS AN AVALANCHE TRIGGER,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
M. Martinelli, Jr.
USDA Forest Service Research Note RM-224, 1972. 7 p, 5 fig, 2 tab, 10 ref.

Descriptors: *Avalanches, *Snowpacks, *Snow cover.
Identifiers: *Sonic boom.

A linear array of detonating cord was used to simulate a sonic boom. The boom from such charges was directed toward the fracture zone of a small avalanche path where the snow was unstable, as indicated by natural avalanches in the area. On three of four tests, avalanches were released by a boom of 12 pounds per square foot (60 kg f/m2) over-pressure after withstanding lesser booms. One of the avalanches had a fracture face 8 feet 11 inches (272 cm) deep. (Forest Service)
W74-00683

SNOW FENCES FOR INFLUENCING SNOW ACCUMULATION,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
M. Martinelli, Jr.
In: Proceedings International Symposia on Role of Snow and Ice in Hydrology, Symposium on Measurement and Forecasting, Banff, Alberta, Canada, September 6-13, 1972. Sess. WMO-5. 6 p, 9 ref.

Descriptors: *Snow management, *Snowpacks, Snow cover, Blizzards, *Colorado.
Identifiers: Blowing snow, *Snow fences, *Mount Bethel (Colo).

The following items that influence the efficiency of collecting snow fences are discussed briefly: height, density and length of fence, bottom gap, length and maximum depth of lee drift, cumulative effect of a set of tandem fences, tilting of fence, terrain effects, and contributing distance. The snow fence project on Mount Bethel in Central Colorado is cited as a practical example of how some of the above items were used to design and lay out snow fences intended to reduce the amount of wind-blown snow deposited in the starting zone of an avalanche that crosses an interstate highway. (Forest Service)
W74-00684

WEATHER CONDITIONS THAT DETERMINE SNOW TRANSPORT DISTANCES AT A SITE IN WYOMING,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. D. Tabler, and R. A. Schmidt.
In: Proceedings, International Symposia on the Role of Snow and Ice in Hydrology, Symposium on Properties and Processes, Banff, Alberta, Canada, September 6-13 1972. 7 p, 4 fig, 6 ref.

Descriptors: Snow, *Sublimation, *Blizzards, *Weather, Snow cover, Snow packs, Winds, Shelterbelts, Snowfall, Snow management, Windbreaks, Water conservation, Water sources, Water balance, Watershed management, *Wyoming, Demonstration watersheds.
Identifiers: *Blowing snow, *Snow transport, Snow drifting, Snow fences, Induced snow accumulation, *Snowdrifts.

A mathematical model for the sublimation of wind-blown snow has recently been published. In a simplified form, the model predicts the distance a particle of given size will travel before completely sublimating; critical variables are particle speed, relative humidity and temperature of the air, and total insolation. Measurements of these conditions, at a site in southeastern Wyoming (elevation 2500 meters) during all drifting events over the 1970-71 winter, indicate average transport distances of 460 and 900 meters, for particle diameters of 0.010 and 0.015 cm, respectively. (Forest Service)
W74-00685

SIMULATING EFFECTS OF HARVEST CUTTING ON SNOWMELT IN COLORADO SUBALPINE FOREST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04C.
W74-00686

GENERALIZATION OF HAEFELI'S CREEP-ANGLE ANALYSIS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. I. Perla.
Journal of Glaciology, Vol 11, No 63, p 447-450, 1972. 2 fig, 5 ref.

Descriptors: Snowpacks, Avalanches, *Stress analysis, Creep.
Identifiers: Snow mechanics, *Slab mechanics, *Creep angle.

Using geometrical arguments, Haefeli developed a stress analysis for slabs of compressible viscous materials. His analysis was based on a key parameter called the creep angle. A generalization of the creep angle, called the deformation-rate coefficient, is derived by replacing geometrical arguments with continuum mechanics. Once the deformation-rate coefficient is found from in situ

measurements, the stress field of the slab can be determined from a set of hyperbolic partial differential equations. (Forest Service)
W74-00687

EFFECT OF SNOW FENCE HEIGHT ON WIND SPEED,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00691

DESIGN OF A WATERSHED SNOW FENCE SYSTEM, AND FIRST-YEAR SNOW ACCUMULATIONS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00695

PHOTOGRAMMETRIC DETERMINATIONS OF SNOW COVER EXTENT FROM UNCONTROLLED AERIAL PHOTOGRAPHS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00697

ISUA, GREENLAND: CALCULATIONS OF GLACIER FLOW FOR AN OPEN-PIT MINE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
S. C. Colbeck.
Research Report 309, July 1973. 24 p, 14 fig, 1 tab, 11 ref, append.

Descriptors: *Glaciers, *Flow, *Movement, *Mining, Rheology, Excavation, Mine water, Water balance.
Identifiers: *Greenland.

A large mineral deposit was discovered at Isua, in southwest Greenland. In addition to the usual problems of mining in the subarctic regions, the exploitation of this mineral resource is complicated by the fact that it lies at the edge of the Greenland Ice Cap. Most of the ore is covered by ice (up to 150 m thick) and, as the ice is stripped away to expose the ore, additional ice flow into the area of the pit is expected. The most favorable profile for the ice surface next to the open pit was calculated. Seven cross sections of flow were considered and in each case the flow characteristics of the most favorable profile were calculated: The results of these cross sections were averaged around the upstream edge of the pit in order to calculate the excavation necessary to establish a favorable profile and the yearly excavation necessary to maintain that profile. (Knapp-USGS)
W74-00818

A STUDY OF WINTER PRECIPITATION AREAS IN RELATION TO SEVERAL INDICATORS OF VERTICAL MOTION--CHAPTER I OF A COMPILATION OF STUDIES FROM ATMOSPHERIC VARIABILITY EXPERIMENT (AVE),
Texas A and M Univ., College Station. Dept. of Meteorology.
For primary bibliographic entry see Field 02B.
W74-00852

CURRENT STATUS OF RESEARCH ON THE BIOLOGICAL EFFECTS OF PESTICIDES IN CHESAPEAKE BAY,
Westinghouse Ocean Research Lab., Annapolis, Md.
For primary bibliographic entry see Field 02L.
W74-00923

DEVELOPMENT OF A SNOWMELT-RUNOFF MODEL FOR THE U.S. TUNDRA BIOME, PROGRESS REPORT,
S. L. Dingman.
International Biological Program, U.S Tundra Biome Report 73-3, June 1973. 43 p, 10 fig, 4 tab, 14 ref, 4 append.

Descriptors: *Snowmelt, *Runoff, *Arctic, *Alaska, *Streamflow forecasting, Mathematical models, River basins, Equations, Dead storage, Topography, Flow rates, Snowpacks, Water equivalent.
Identifiers: *Barrow (Alaska).

Progress in applying a simple three-parameter equation to the simulation of snowmelt runoff on the Arctic Coastal Plain is described. The parameters are: (1) the amount of water held in 'dead storage' on the basin, S2; (2) a timing parameter, K, that depends on the physical characteristics of the basin; and (3) a parameter, N, that depends on the mode of flow within the basin. The three parameters are best determined by examining streamflow records from the basin to be modeled. The equation is incorporated and tested in a series of three computer simulation programs of increasing complexity. The final form inclued an accounting for varying water equivalents on varying proportions of the basin. The results of the tests of this model against measured snowmelt runoff from a 1.45 sq mi basin near Barrow, Alaska, indicate that the model is very promising, and should be tested and developed further. Data requirements, advantages, and disadvantages of the model are discussed. (Woodard-USGS)
W74-01094

2D. Evaporation and Transpiration

COMPUTATION OF MAXIMUM STORM RUNOFF FOR DESIGNING EROSION CONTROL STRUCTURES IN SOUTHWESTERN EUROPEAN RUSSIA (RASHET MAKSIMAL'NOGO LIVNEVOGO STOKA PRI PROYEKTIROVANII PROTIVOEROZIONNYKH SOORUZHENIY V YUGO-ZAPADNOY CHASTI YETS),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
P. F. Vishnevskiy.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 92-104, Moscow, 1971. 4 fig, 3 tab, 9 ref.

Descriptors: *Watershed management, *Watersheds (Basins), *Erosion control, *Water yield, *Storm runoff, Overland flow, Slopes, Discharge (Water), Probability, Equations.
Identifiers: *European USSR, Traveltime, Nomograms.

The southwestern part of European Russia is located in a zone of intense rainfall activity. Heavy rains (100 mm or more) occur each year and cause severe gully erosion. Recommendations are developed for calculating maximum storm runoff in designing erosion control structures on eroded lands of natural watersheds. These recommendations can be used to calculate maximum discharges and storm-runoff volumes of varying probabilities for very small watersheds and channel-free slopes in southwestern regions of European Russia. (See also W74-00592) (Josefson-USGS)
W74-00600

EFFECTIVE AVAILABLE WATER AND ITS RELATION TO EVAPOTRANSPIRATION RATE, DEPTH OF WETTING, AND SOIL TEXTURE,
Agricultural Research Service, Prosser, Wash.
For primary bibliographic entry see Field 02G.
W74-00608

THE ROCKY MOUNTAIN MILLIVOLT INTEGRATOR FOR USE WITH SOLAR RADIATION SENSORS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
J. R. Thompson, and A. D. Ozment.
USDA Forest Service Research Note RM-225, 1972. 8 p, 8 fig, 11 ref.

Descriptors: *Electronic equipment, *Instrumentation, On-site data collections, Solar radiation.
Identifiers: *Solar radiation integrator, *Millivolt integrator.

Electronic integration of a radiometer's millivolt signal is a practical and accurate means of obtaining hourly, daily, weekly, or long-term radiation values. One such instrument has recently been designed and built by the Rocky Mountain Station. It consists of four printed circuit boards, a synchronous bi-directional stepper motor, and a five-decade counter. Each integrator is calibrated to match the millivolt output of the radiation sensor, so that the counter reads directly in langleys. The totalizing of a signal from a typical net radiometer (with a 6.20mv/langley output) would be within plus or minus 1 percent over most of the positive signal range, but could be 5 percent too low at night when the sensor output is negative. (Forest Service)
W74-00690

PRELIMINARY RESULTS OF WATER LEVEL CONTROL ON SMALL PLOTS IN A PEAT BOG,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 04A.
W74-00694

XYLEM WATER POTENTIALS AND STOMATAL RESISTANCE IN BOG PLANTS: ECOLOGICAL IMPLICATIONS,
New Hampshire Univ., Durham. Dept. of Botany.
For primary bibliographic entry see Field 02I.
W74-00719

RELATIONSHIP OF TRANSPIRATION TO ATMOSPHERIC VAPOR PRESSURE,
Arizona Univ., Tucson.
F. D. Cole, and J. P. Decker.
Journal of the Arizona Academy of Science, Vol 8, No 2, p 74-75, June 1973, 2 fig, 5 ref.

Descriptors: *Transpiration, *Evapotranspiration, *Humidity, *Vapor pressure, Consumptive use, Plant growth, *Beans, Leaves.

Transpiration of illuminated bean plants was determined by measuring weight loss while plants were exposed to air of constant humidity, temperature, and circulation. The vapor pressure of water within the leaves was computed from internal temperatures measured with thermocouples. Vapor pressure of external air was measured directly by infrared gas analysis. Transpiration rate was then determined to be linear, but not a proportional function of the difference between these two vapor pressures. In a similar study using an atmometer instead of a plant, evaporation varied linearly and nearly proportionally with vapor pressure difference. The disproportionalities are interpreted as indicating that the temperature of the thermocouple consistently exceeded the temperature of the actual evaporating surface. The determination of this relationship of transpiration to atmospheric vapor pressure is especially significant in arid regions where water loss through transpiration is most important since such a relationship can help estimate the amount of water lost in this manner. (Muller-Arizona)
W74-00759

THE USE OF TENSIOMETERS AS INDICATORS OF SOIL MOISTURE AVAILABILITY FOR PLANTS, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics.
For primary bibliographic entry see Field 03F.
W74-00989

NEW POINTS OF VIEW ON THE PHYTOGEOGRAPHIC POSITION OF THE HIGH ARDENNES, (IN GERMAN),W. VAN COTTHEM.
Ghent Rijksuniversiteit (Belgium). Laboratorium voor Systematiek Morfologie.

Biol Jaarb. 39 p 122-144. 1971, Illus.
Identifiers: *Ardennes region, Belgibum, Climates, *Evapotranspiration, France, Geographic, Luxembourg, Soils, Transpiration, Vegetation, *Phytogeographic position.

The exact phytogeographic position of the High Ardennes (France-Belgium-Luxembourg) has not been definitively determined. Some believe that the high Ardennes plateaus deserve the rank of a district, while others consider tham a subdistrict of the vast Ardennes district. It is not considered a separate district according to the Braun-Blanquet definition. It is suggested that data on potential evapotranspiration for different localities (Thornthwaite's climatic classification) would help establish direct relations between the vegetation, and soil and the climate.--Copyright 1973, Biological Abstracts, Inc.
W74-01025

2E. Streamflow and Runoff

TRAVEL TIME OF GEORGIA STREAMS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 04A.
W74-00556

RIVER MILE INDEX--NAPA, SALINAS, AND EEL RIVER BASINS, CALIFORNIA.
Federal Power Commission, San Francisco, Calif. Regional Office.

Pacific Southwest Inter-Agency Committee, Water Management Technical Subcommittee report, June 1973. 37 p, 2 fig.

Descriptors: *Distance, *River systems, *Indexing, *California, Documentation, River basins, Tributaries, Drainage area, Elevation.
Identifiers: *River mile index, *Pacific Southwest, Napa River basin (Calif), Salinas River basin (Calif), Eel River basin (Calif).

This river mile index for the Napa, Salinas and Eel River basins in California is one of a series of reports for stream basins in the Pacific Southwest. River mileages were determined from independent measurements made on U.S. Geological Survey topographic quadrangles. The U.S. Geological Survey furnished information on stream gage locations, drainage areas, and water elevations at key points. Streams are designated by order number to indicate their relationship in the basin network. First order streams are main stem streams with an outlet on the sea. Tributaries to these are second order, tributaries to second order are third order, etc. In making the index, the river mile distances were measured upstream from the mouth to the nearest tenth of a mile. (Woodard-USGS)
W74-00585

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 9. COLORADO RIVER BASIN--VOLUME 2. COLORADO RIVER BASIN FROM GREEN RIVER TO COMPACT POINT.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00586

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS--VOL 3. UPPER MISSISSIPPI RIVER BASIN BELOW KEOKUK, IOWA.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00587

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 3. OHIO RIVER BASIN--VOLUME 4. OHIO RIVER BASIN BELOW WABASH RIVER.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C. *
W74-00588

STREAMFLOW FORMATION, COMPUTATIONS, AND REGULATION (FORMIROVANIYE, RASCHETY I REGULIROVANIYE RECHNOGO STOKA).
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 04A.
W74-00592

PROCEDURES FOR COMPUTING MOVEMENT OF SPRING FLOW ALONG THE CASCADE OF RESERVOIRS ON THE DNIEPER RIVER (METODIKA RASCHETA DVIZHENIYA VESENNEGO STOKA PO KASKADU VODOKHRANILISHCH NA DNEPRE),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 04A.
W74-00593

EXPERIMENT IN CALCULATING MOVEMENT OF THE 1970 FLOOD WAVE ALONG THE CASCADE OF DNIPER RESERVOIRS (OPYT RASCHETA DVIZHENIYA VOLNY POLOVOD'YA 1970 G. PO KASKADU DNEPROVSKIKH VODOKHRANILISHCH),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
I. A. Zheleznyak, L. B. Byshovets, and A. I. Shereshevskiy.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 23-30, Moscow, 1971. 3 fig, 1 tab, 4 ref.

Descriptors: *Flood waves, *Flood flow, *Flood routing, *Reservoirs, *Discharge (Water), Flood discharge, Stage-discharge relations, Hydrographs, Reservoir storage, Inflow, Gaging stations, Hydroelectric plants.
Identifiers: USSR, *Dnieper River.

Construction of reservoirs and operation of hydroelectric powerplants have altered the natural water regime of the Dnieper River. To compute flood-wave movement in reservoirs, a study was made of the 75-year flood which occurred on the Lower Dnieper between Kiev and Kakhovka in the spring of 1970. Factors responsible for the spring flood on all rivers forming inflow to the reservoir of the Kiev Hydroelectric Powerplant and to Kiev were analyzed. Computations were performed in many variants of water flow from inlet gaging stations on the Pripyat', Dnieper, Sozh, and Desna Rivers to Kakhovka. These include routing in 16 river reaches and 5 reservoirs by procedures developed to show the regulating effect of the reservoir cascade on spring runoff of the Lower Dnieper. Computation errors did not exceed 10% for over 50% of the outflow discharges in each reservoir and were within limits of 5% for about 40% of the discharges. (See also W74-00592) (Josefson-USGS)
W74-00594

SHORT-TERM FORECAST OF DAILY DISCHARGES OF THE DNIEPER RIVER AT KIEV DURING THE PERIOD OF THE 1970 FLOOD (O KRATKOSROCHNOM PROGNOZE YEZHEDNEVNYKH RASKHODOV DNEPRA U KIYEVA V PERIOD POLOVOD'YA 1970 G.),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 04A.
W74-00595

CALCULATION OF SPRING RUNOFF DEPTH IN CARPATHIAN RIVERS (RASCHET SLOYA VESENNEGO STOKA REK KARPAT),
Ukraniskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 04A.
W74-00597

FLASH FLOODS ON CARPATHIAN RIVERS IN JUNE 1969 AND MAY 1970 (LIVNEVYYE PAVODKI NA REKAKH KARPAT V IYUNE 1969, MAYE 1970 G.),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
P. M. Lyutik.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 75-85, Moscow, 1971. 3 fig, 2 tab, 4 ref.

Descriptors: *Flash floods, Rivers, *Flood discharge, *Peak discharge, *Flood stages, Flood damage, Runoff, Runoff coefficient, Precipitation (Atmospheric), Hydrographs, Water levels.
Identifiers: USSR, *Ukraine, *Carpathian Mountains.

Catastrophic floods produced by continuous heavy rains occurred in the Dniester, Prut, Seret, and Tisza River basins in the Ukrainian Carpathians in Jun 1969 and May 1970. Heaviest rains occured June 7-10, 1969, and the precipitation which fell in the Chernovtsy, Ivano-Frankovsk, and L'vov Oblasts in June (200-400 mm) exceeded the average monthly value by more than 300%. The floods inundated populated areas, agricultural lands and livestock farms, and damaged railroads, highways, bridges, oil wells and fields, high-tension powerlines, gas mains, building enterprises, etc. Rainfall of a duration of 25-40 hours covered an area of about 22,000 sq km. Rains were heaviest in upper reaches of the Bystritsa Nadvornyanskaya, Bystritsa Solotvinskaya, Lomnitsa, and Prut Rivers, where precipitation amounted to about 300 mm. Maximum flood stages and peak discharges were the highest recorded in the last 100 years on some reaches of the Stryy, Lomnitsa, Bystritsa Solotvinskaya, Bystritsa Nadvornyanskaya and upper reaches of the Prut and Seret Rivers in June 1969 and on the Tisza River in May 1970. To study flood flormation conditions and to determine peak discharges, investigations were carried out by the Ukrainian Hydrometeorological Scientific Research Institute and by hydrologic stations of the Ukrainian Hydrometeorological Service. Flood-discharge hydrographs were constructed, and flood duration and runoff depths and coefficients were determined. Flood characteristics on Carpathian rivers in June 1969 and peak discharges on Carpathian rivers in May 1970 are tabulated. (See also W74-00592) (Josefson-USGS)
W74-00598

FACTORS RESPONSIBLE FOR FLOODFLOW IN CARPATHIAN RIVERS (AS ILLUSTRATED BY THE STRYY AND BYSTRITSA RIVERS) (FAKTORY PAVODOCHNOGO STOKA KARPATSKIKH REK (NA PRIMERS STRYYA I BYSTRITSY)),
Ukrainskii Nauchno-Issledovatelskii Gidgrometeorologicheskii Institut, Kiev (USSR).
G. V. Pavlenko.

In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 86-91, Moscow, 1971. 1 fig, 6 ref.

Descriptors: *Flood flow, *Floods, Rivers, *Tributaries, Watersheds (Basins), Surface-groundwater relationships, Rainfall-runoff relationships, Snowmelt, Soil moisture, Freezing, Seasonal.
Identifiers: *Ukraine, Carpathian Mountains, *Stryy River (USSR), *Bystritsa River (USSR).

Flood formation conditions during warm and cold periods of the year were investigated on two large physiographically similar mountain tributaries of the Dniester River: Stryy to Mezhibrod (drainage area--2,400 sq km) and Bystritsa to Yamnitsa (drainage area--2,450 sq km). Recommendations were developed for computing daily water yield from snow and rainwaters with allowance for basin elevation. A relation of runoff depth of rainfall and rainfall-snowmelt floods to daily water flow onto the basin surface, preflood groundwater discharge, soil moisture content, and depth of soil freezing was established for the Stryy and Bystritsa Rivers. (See also W74-00592) (Josefson-USGS)
W74-00599

ANNUAL STREAMFLOW SUMMARIES FROM FOUR SUBALPINE WATERSHEDS IN COLORADO,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00676

WATER YIELD CHARACTERISTICS OF THREE SMALL WATERSHEDS IN THE NORTHEASTERN BLACK HILLS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00677

FLOW AND CHANNEL CHARACTERISTICS OF TWO HIGH MOUNTAIN STREAMS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04A.
W74-00678

CONTRIBUTIONS TO THE KNOWLEDGE OF BIOGENIC ELEMENTS AND PHTOPLANKTON ASSOCIATIONS DYNAMICS IN FRASINET POND DURING NOVEMBER 1969-NOVEMBER 1970, (IN RUMANIAN),
For primary bibliographic entry see Field 05C.
W74-00727

COMPARISON OF FIELD METHODS FOR MEASURING STREAM DISCHARGE,
New York State Dept. of Environmental Conservation, Delmar. Wildlife Research Lab.
R. Engstrom-Heg.
N Y Fish Game J. Vol 18, No 2, p 77-96, 1971, Illus.
Identifiers: Discharge, Field methods, Measurement, *Stream discharge, *Salt-dilution methods, *Gaging.

Stream discharges were measured by a modification of Embody's float method and by 2 salt-dilution methods using a specific condictivity meter. In one of the latter, salt solution was introduced from a plastic constant-flow carboy. In the other, salt was introduced by solution from pre-weighed salt blocks. A precise relationship between NaCl concentration, temperature and specific conductivity is given in nomographic form, permitting rapid determination of changes in salt concentration. Comparison with US Geological Survey stream-gage readings showed that each method, when used in a suitable location, provided discharge measurements sufficiently accurate for most aquatic biological applications. The salt-dilution methods, in particular, can be used in very shallow, very turbulent and very sluggish streams where the more standard current-meter method is not applicable. Between them, the 3 methods described provide means for fairly rapid, easy and inexpensive gaging of the great majority of small and medium-sized streams.--Copyright 1973, Biological Abstracts, Inc.
W74-00735

BIBLIOGRAPHY OF REPORTS ON THE WATER RESOURCES OF INDIANA PREPARED BY THE U.S. GEOLOGICAL SURVEY, 1886--1972,
Geological Survey, Indianapolis, Ind.
M. J. Wilson.
Open-file report, 1973. 35 p, 1 fig, 3 tab.

Descriptors: *Bibliographies, *Water resources, *Water quality, *Indiana, Surface waters, Groundwater, Hydrologic data, Data collections, Streamflow, Flow rates, Aquifer characteristics, Water wells, Water yield, Water utilization, Hydrology, Hydrogeology, Chemical analysis, Water analysis, Water chemistry, Publications.
Identifiers: Water supply papers.

This bibliography contains a complete history to December 1972 of reports relating to the water resources of Indiana prepared by U.S. Geological Survey personnel. Many of the reports discuss related subjects of geology, hydrology, and chemical quality of the water. The bibliography is divided into three major parts: (1) publications of the U.S. Geological Survey; (2) open-file reports of the Geological Survey; and (3) other publications--reports prepared by Survey personnel but published by other agencies or by professional organizations in their journals. An index to the bibliography is included. Annual USGS water-supply papers are listed, by number and period of time covered, in three tables: (1) groundwater, (2) surface water, and (3) water quality. (Woodard-USGS)
W74-00814

NUMERICAL SIMULATION OF UNSTEADY FLOWS IN RIVERS AND RESERVOIRS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-00816

HEC-1, FLOOD HYDROGRAPH PACKAGE--USERS MANUAL, COMPUTER PROGRAM 723-X6-L2010.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-00821

COMPUTER PROGRAM 723-X6-L202A, HEC-2, WATER SURFACE PROFILES--USERS MANUAL.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-00822

COMPUTER PROGRAM 723-X6-L202A, HEC-2, WATER SURFACE PROFILES--PROGRAMMERS MANUAL.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-00823

WATER RESOURCES DATA FOR NEW YORK, 1972: PART 1. SURFACE WATER RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 07C.
W74-00825

FLOOD STUDIES,
Bureau of Reclamation, Denver, Colo. Flood Hydrology Section.
For primary bibliographic entry see Field 08A.
W74-01061

QUANTITY AND CHEMICAL QUALITY OF LOW FLOW IN THE UPPER COLORADO RIVER BASIN, TEXAS, APRIL 8, 1968,
Geological Survey, Austin, Tex.
J. Rawson.
Texas District open-file report, September 1973, 24 p, 3 fig, 2 tab, 5 ref.

Descriptors: *Base flow, Flow rates, *Water quality, *Texas, Streamflow, Chemical analysis, Basic data collections, Drainage area, Geology, Stream gages, Water analysis, Water chemistry, Geochemistry, Surface-groundwater relationships, *Low flow, Salinity, *Dissolved solids.
Identifiers: *Colorado River basin (Tex.).

Changes are defined in the quantity and quality of flow in a 103.2-mile reach of the Colorado River below Lake J. B. Thomas on April 8, 1968, a period when most of the flow was sustained by groundwater effluent. Flow in the reach increased from zero at mile 836.6 to 5.53 cfs at mile 733.4. Measured inflow from tributaries totaled 5.81 cfs. Thus, the interchange of surface and groundwater in the main-stem Colorado River resulted in a net loss of 0.28 cfs. The interchange of surface water and groundwater in the reach, supplemented by the inflow from tributaries, resulted in a net decrease in the concentration of dissolved solids from 16,900 mg/liter at mile 826.3 to 4,140 mg/liter at mile 733.4. However, significant increases in the concentration of dissolved solids occurred within some of the subreaches. The largest increase occurred in the subreach between mile 813.4 and mile 796.3 which is underlain by the Dockum Group. Dissolved solids in this subreach increased from 3,600 mg/liter at the upstream end of the reach to 6,660 mg/liter at the downstream end. (Woodard-USGS)
W74-01090

HEC-4, MONTHLY STREAMFLOW SIMULATION, COMPUTER PROGRAM 723-X6-L2340.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-01091

2F. Groundwater

GROUND WATER, A RESOURCE TO BE PROTECTED,
Minnesota Dept. of Natural Resources, St. Paul.
For primary bibliographic entry see Field 05B.
W74-00566

THE NATIONAL QUALITY OF GROUND WATER IN MINNESOTA,
Geological Survey, St. Paul, Minn.
T. C. Winter.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 11-29, February 1973. 9 fig, 13 ref. 14-31-0001-3823.

Descriptors: *Water quality, *Groundwater, *Minnesota, Water chemistry, Water analysis, Water resources development, Water management (Applied), Data collections, Hydrologic data.

Groundwater occurs in four hydrogeologic environments in Minnesota; fractures in crystalline rocks, Paleozoic sedimentary rocks, Cretaceous sedimentary rocks, and glacial drift. The chemical

and mineralogic properties of these rocks and the movement of water through them results in the occurrence of distinct water-quality types in the State. Chemical analyses of ground water samples collected throughout the State were classified by a graphical technique. Calcium magnesium bicarbonate type water occurs throughout the State and predominates in the eastern three-fourths. Calcium magnesium sulfate, sodium bicarbonate, and sodium chloride types of groundwater occur in complex vertical and areal relationships in western Minnesota. The occurrence of water having dissolved-solids content greater than 1,000 milligrams per liter is limited largely to northwest and southwest Minnesota, where water types other than calcium magnesium bicarbonate are common. (See also W73-09113) (Knapp-USGS)
W74-00567

HYDROGEOLOGIC FRAMEWORK FOR DETERIORATION IN GROUNDWATER QUALITY,
Minnesota Univ., St. Paul. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 05B.
W74-00569

GROUND WATER QUALITY INFORMATION SYSTEMS - EXPERIENCES IN OTHER STATES,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 07C.
W74-00576

WATER RECHARGE IN A SOIL WITH SHRINKAGE CRACKS,
Hohenheim Univ., Stuttgart-Hohenheim (West Germany).
For primary bibliographic entry see Field 02G.
W74-00602

GROUNDWATER RESOURCES OF THE USSR (RESURSY PODZEMNYKH VOD SSSR),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
N. I. Plotnikov.
Vodnyye Resursy, No 1, p 140-150, 1973. 3 tab.

Descriptors: *Groundwater resources, *Groundwater availability, *Freshwater, *Water supply, Groundwater mining, Safe yield, Water demand, Water users, Irrigation, Water utilization, Withdrawal, Exploitation, Exploration, Hydrogeology, Forecasting.
Identifiers: *USSR.

Distribution of fresh groundwater in the USSR is extremely uneven. Primary known sources of fresh groundwater are located in artesian basins of platforms and geosynclines; sandy-gravelly deposits of river valleys and piedmont alluvial fans; sandy-gravelly fluvioglacial formations; and in carbonate rocks. Present fresh groundwater use in the USSR relative to total known resources is about 6%. For individual Union Republics, the percentage is much higher: Armenia (96%), Turkmenistan (77%), Moldavia (75%), Azerbaydzhan (52%), and the Ukraine (36%). A large amount of fresh groundwater (313 cu m/sec) is used to meet domestic, municipal, and industrial water supply demands. Water supplied to over 62% of Soviet cities is derived entirely from the groundwater reservoir. Groundwater withdrawals for urban water supply are 150 cu m/sec in the RSFSR, 50 cu m/sec in the Ukraine, 20 cu m/sec in Uzbekistan, 16 cu m/sec in Kazakhstan, 12 cu m/sec in Belorussia and Georgia, and about 10 cu m/sec in Armenia. According to incompiete figures, fresh groundwater withdrawals for irrigation total 300 cu m/sec, including 130 cu m/sec in the Ukraine, 60 cu m/sec in Azerbaydzhan, 38 cu m/sec in Armenia, about 25 cu m/sec in Tadzhikistan, and about 16 cu m/sec in Uzbekistan. Known fresh groundwater resources in the USSR and degree of their exploration and use by Union Republics are tabulated, and basic trends in the development of hydrogeology and problems confronting the Hydrogeological Service of the USSR are outlined. (Josefson-USGS)
W74-00845

PATTERNS OF LONG-TERM NATURAL FLUCTUATIONS OF GROUNDWATER LEVELS (ZAKONOMERNOSTI MNOGOLETNIKH YESTESTVENNYKH KOLEBANIY UROVNEY PODZEMNYKH VOD),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
V. S. Kovalevskiy.
Vodnyye Resursy, No 1, p 161-177, 1973. 10 fig, 18 ref.

Descriptors: *Groundwater movement, *Water level fluctuations, *Water table, Aquifers, Zone of aeration, Depth, Hydrogeology, Cycles, Correlation analysis, Histograms, Forecasting.
Identifiers: *USSR.

Analysis of long-term groundwater-level fluctuations is usually reduced to a determination of possible long-term changes in aquifer thicknesses or possible changes in groundwater depths. The extent of long-term fluctuations depends on the relation of the aquifer to the ground surface and on the hydrogeology, geological structure, geomorphology, microrelief, and climatic conditions of the region. Long-term cyclic fluctuations of groundwater levels have no strict periodicity in time, and cycle designations are arbitrary. For forecasting, the presence of clear groupings of successive low- and high-water years must be established. Relation of seasonal annual and long-term average annual ranges of groundwater-level fluctuations depends on the thickness of the zone of aeration. Ranges of long-term groundwater-level fluctuations are generally directly proportional to the length of the cycle period. Small (2, 3 and even 5-7 year) cycles are observed in loose deposits whenever groundwater depths are shallow or conditions are favorable for infiltration of precipitation through the zone of aeration. In the USSR, the role of small cycles decreases and the role of large cycles increases from north to south with the gradual increase in average depths to the groundwater surface in the same direction. There is no synchronous occurrence of long-term extremal groundwater-level values. (Josefson-USGS)
W74-00846

POSSIBILITIES OF USING GEOPHYSICAL METHODS IN A STUDY OF FRESHWATER DISCHARGES IN LITTORAL ZONES OF SEAS (O VOZMOZHNOSTYAKH GEOFIZICHESKIKH METODOV PRI IZUCHENII RAZGRUZOK PRESNYKH VOD V PRIBREZHNYKH ZONAKH MOREY),
Moscow State Univ. (USSR).
V. A. Bogoslovskiy, and A. A. Ogil'vi.
Vodnyye Resursy, No 1, p 178-185, 1973. 2 fig, 1 tab, 4 ref.

Descriptors: *Submarine springs, *Discharge (Water), Freshwater, *Analytical techniques, *Geophysics, Electrical studies, Geothermal studies, Borehole geophysics, Electrical well logging, Electrodes, Resistivity, Electrical resistance, Resistance, Rock properties, Bottom sediments, Sea water, Littoral, Subsurface mapping.
Identifiers: *Odessa (USSR), *Abkhazia (USSR).

Application of electric and thermometric geophysical methods to a study of submarine springs, and characteristics and techniques of marine geophysical investigations are described. Investigations performed in the region of Odessa and near Gantiadi village (Abkhazia) show that thermometric and electric methods can be used to effectively map submarine springs and to study conditions of their discharge. (Josefson-USGS)
W74-00847

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME I.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00888

GROUND WATER POLLUTION AND CONSERVATION,
For primary bibliographic entry see Field 04B.
W74-00938

DEAD END PORE VOLUME AND DISPERSION IN POROUS MEDIA,
Jersey Production Research Co., Tulsa, Okla.
For primary bibliographic entry see Field 08B.
W74-00951

A STOCHASTIC MODEL FOR PREDICTING VARIATIONS IN RESERVOIR ROCK PROPERTIES,
Alberta Univ., Calgary.
For primary bibliographic entry see Field 08E.
W74-00955

BOREHOLE LOGGING INVESTIGATIONS IN THE CHALK OF THE LAMBOURN AND WINTERBOURNE VALLEYS OF BERKSHIRE,
Institute of Geological Sciences, London (England).
For primary bibliographic entry see Field 08G.
W74-00956

2G. Water in Soils

WATER RECHARGE IN A SOIL WITH SHRINKAGE CRACKS,
Hohenheim Univ., Stuttgart-Hohenheim (West Germany).
G. Blake, E. Schlichting, and U. Zimmermann.
Soil Science Socity of America Proceedings, Vol 37, No 5, p 669-672, September-October 1973. 4 fig, 2 tab, 8 ref.

Descriptors: *Infiltration, *Recharge, *Soil water movement, Interstices, Tracers, Soil physical properties, Tritum, Expansive soils, Shrinkage, Permeability, Hydraulic conductivity.
Identifiers: *Shrinkage cracks.

Flow of water was studied in a relatively dry Pelosol characterized by fine shrinkage cracks between peds. The coefficient of linear expansion was 0.115 in peds of the Bva horizon between oven dryness and 0.3-bar moisture content. After a prolonged period in which evapotranspiration exceeded rainfall, 200 micro Ci of tritium were added with 100 liters of water to a plot 1.4 by 1.4 m. Replicated soil samples were taken after 24 hours and again 14 days later. Tritiated water was not confined to surface layers, about half being found below the 20-cm depth. Small amounts were found to the 100/cm sampling depth. Tritiated water did not wet the surface layers to the 0.3-bar percentage. Water additions of 765 mm applied to an adjoining plot over a period of 1 month showed gradual accumulation in the surface horizons of the profile rather than wetting to field capacity in layers that wet from the soil surface downward. These results are interpreted to indicate that water flowed down fine cracks in A and B horizons as free water, some of it soaking into the ped walls, or running into the C horizon. This was confirmed by measurements of the tritium concentration on

crack walls. It was significantly higher on ped surface in the Bva horizon than in soil taken from within the peds. (Knapp-USGS)
W74-00602

VERTICAL INFILTRATION INTO A LAYERED SOIL,
Connecticut Agricultural Experiment Station, New Haven. Dept. of Ecology.
D. E. Aylor, and J-V. Parlange.
Soil Science Society of America Proceedings, Vol 37, No 5, p 673-676, September-October 1973. 3 fig, 8 ref.

Descriptors: *Infiltration, *Unsaturated flow, *Soil horizons, *Equations, Anisotropy, Soil structure, Soil physical properties, Mathematical studies, Wetting, Saturated flow, Hydraulic conductivity.

An analytical model describes the soil moisture profiles for vertical infiltration into a layered soil (a fine textured layer over a coarser layer). For the case of constant imposed flux of water at the surface, the effect of an initial soil moisture content that increases with depth causes a steepening of the moisture profile; and the effect of the discontinuity in soil texture at the interface causes an accumulation of water above the interface in the fine textured soil. The technique is easy to apply and gives results which are in good agreement with experiment and substantially better than those obtained by computer simulation. (Knapp-USGS)
W74-00603

PROPAGATION OF SINUSOIDAL SOLUTE DENSITY OSCILLATIONS IN THE MOBILE AND STAGNANT PHASES OF A SOIL,
Wisconsin Univ., Madison. Dept. of Soil Science.
P. A. C. Raats.
Soil Science Society of America Proceedings, Vol 37, No 5, p 676-680, September-October 1973. 3 fig, 6 ref.

Descriptors: *Soil water movement, *Leaching, *Path of pollutants, *Soil structure, Absorption, Ion exchange, Equations, Pores, Solutes, Translocation, Ion transport.

The propagation of a sinusoidal solute density oscillation in soil water movement is analyzed in terms of its absorption coefficient, phase shift factor, and speed. In order to account for the structure of a soil, a solute may be considered to be divided between a mobile phase and stagnant phase. The mobile phase may correspond to the solution in a system of large pores and is assumed to move at a uniform, constant velocity in a certain direction. The stagnant phase may correspond to the solution in a system of small pores. The distribution and exchange of solute between the mobile and stagnant phases in assumed to be described by the ratio of the capabilities of the two phases to store solute and finite response time. The model shows clearly that the solute tends to bypass the stagnant phase. The results suggest several methods for measuring the parameters describing the interaction between the soil and the solute, and are of interest with regard to leaching of fertilizers and organic chemicals applied at the soil surface. (Knapp-USGS)
W74-00604

UNSTABLE WETTING FRONTS IN UNIFORM AND NONUNIFORM SOILS,
Wisconsin Univ., Madison. Dept. of Soil Science.
P. A. C. Raats.
Soil Science Society of America Proceedings, Vol 37, No 5, p 681-685, September-October 1973. 1 fig, 18 ref.

Descriptors: *Infiltration, *Wetting, *Soil water movement, Unsaturated flow, Anisotropy, Soil horizons, Hydraulic conductivity, Soil physical properties, Equations.

If the velocity of a plane wetting front increases with depth of penetration, then the front will be unstable, and a small perturbation of an initially plant front will tend to grow. On the basis of a simple hydraulic model due to Green and Ampt, criteria for instability were derived. Decreases of depth of ponding and of capillary pressure head at the wetting front, increaes with depth of the hydraulic conductivity and the initial water content, and compression of soil air ahead of the wetting front all have the effect of enhancing instability of the wetting front. The capillary pressure head at the wetting front is proportional to the surface tension and the cosine of the angle of contact of the water-air-soil interface and inversely proportional to the radius of curvature of the air-water interface, which in turn is proportional to the mean size of the soil particles. The analysis is extended to nonuniform soils. Criteria for instability of flows in layered soils and soils with crusts are included as special cases. (Knapp-USGS)
W74-00605

DISSOLVED ALUMINUM IN ACID SULFATE SOILS AND ACID MINE WATERS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soil and Science and Geology.
For primary bibliographic entry see Field 05B.
W74-00607

EFFECTIVE AVAILABLE WATER AND ITS RELATION TO EVAPOTRANSPIRATION RATE, DEPTH OF WETTING, AND SOIL TEXTURE,
Agricultural Research Service, Prosser, Wash.
D. E. Miller, and J. S. Aarstad.
Soil Science Society of America Proceedings, Vol 37, No 5, p 763-766, September-October 1973. 6 fig, 3 tab, 6 ref.

Descriptors: *Soil moisture, *Available water, *Evapotranspiration, Field capacity, Moisture content, Drainage, Irrigation.

The effect of evapotranspiration (Et) rate on effective available water (EAW) was evaluated for three soils ranging in texture from sand to silt loam, at evapotranspiration rates of about 0.4 to 1.3 cm per day, and at two depths of wetting. In all cases, as evapotranspiration rate increased, drainage following irrigation decreased and as a result EAW increased. The increase in EAW due to Et rate was relatively greater in the sand than in the finer textured soils. If only midsummer Et rates are considered, EAW may be estimated quite well from a field capacity test, provided soil depth and soil texture are considered in determining the sampling time for characterizing field capacity. If usable water is referenced to some safe depletion level rather than to the 15-bar percentage, the effect of Et is more important. EAW is influenced differently by depth of wetting in different textured soils. (Knapp-USGS)
W74-00608

SALTS IN IRRIGATION DRAINAGE WATERS: I. EFFECTS OF IRRIGATION WATER COMPOSITION, LEACHING FRACTION, AND TIME YEAR ON THE SALT COMPOSITIONS OF IRRIGATION DRAINAGE WATERS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 04C.
W74-00609

EFFECT OF FOREST COVER REMOVAL ON DEPTH OF SOIL FREEZING AND OVERLAND FLOW,
Forest Service (USDA), La Crosse, Wisc. Watershed Lab.
R. S. Sartz.
Soil Science Society of America Proceedings, Vol 37, No 5, p 774-777, September-October 1973. 4 fig, 4 tab, 9 ref.

Descriptors: *Frost, *Overland flow, *Infiltration, *Clear-cutting, Water yield improvement, Forest management, Rainfall-runoff relationships, Vegetation effects, Watershed management, *Wisconsin.

Depth of soil freezing and overland flow were measured under four hardwood forest conditions in southwestern Wisconsin: woody vegetation cut and removed; all vegetation cut and removed; uncut forest with litter removed; and undisturbed forest. Removing only the litter and removing all the vegetation increased both soil freezing depth and overland flow. Removing only the woody vegetation decreased both. Frost depth means, in a year of deep frost, were 6 and 11 cm on the woody vegetation removed and undisturbed plots, and 19 and 35 cm on the all vegetation-removed and liter-removed plots. Overland flow values ranged from less than 1 cm on the woody vegetation-removed plots to more than 7 cm on the all vegetation-removed and litter-removed plots. The increases in frost depth and overland flow appeared to be related to changes in soil bulk density and porosity. (Knapp-USGS)
W74-00610

ANION EXCLUSION AND COUPLING EFFECTS IN NONSTEADY TRANSPORT THROUGH UNSATURATED SOILS: I. THEORY,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Soil Physics.
E. Bresler.
Soil Science Society of America Proceedings, Vol 37, No 5, p 663-669, September-October 1973. 4 fig, 1 tab, 22 ref.

Descriptors: *Dispersion, *Soil water movement, *Ion exchange, *Osmosis, *Ion transport, Mathematical models, Numerical analysis, Clays, Simulation analysis, Unsaturated flow, Adsorption.

A simulation model for the simultaneous transport of anions and water takes into account physicochemical interaction between the solutes and the soil matrix. The effects of convection, ionic diffusion, mechanical dispersion, anion exclusion (negative adsorption), and coupling phenomena are considered jointly. The dependence of the osmotic efficiency coefficient and anion exclusion of soil water content and solution concentration are estimated from diffuse double-layer theory and hydrodynamic considerations. These estimates compare favorably with available data on clays and soils. The nonsteady flow equations are solved by a numerical approach that eliminates numerical dispersion. An infiltration experiment was characterized by relatively high water contents and rapid flow; this showed that osmotic gradients are of minor importance. A slight anion exclusion brought about some improvement in the comparison between the theoretical data. (Knapp-USGS)
W74-00611

DEGRADATION OF CHLORINATED HYDROCARBONS BY CLOSTRIDIUM SP. ISOLATED FROM LINDANE-AMENDED, FLOODED SOIL,
Central Rice Research Inst., Cuttack (India).
For primary bibliographic entry see Field 05B.
W74-00664

WHEAT RESPONSE TO SOIL MOISTURE AND THE OPTIMAL IRRIGATION POLICY UNDER CONDITIONS OF UNSTABLE RAINFALL,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 03F.
W74-00669

GENERALIZATION OF HAEFELI'S CREEP-ANGLE ANALYSIS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.

For primary bibliographic entry see Field 02C.
W74-00687

SOIL WATER DEPLETION BY A HARDWOOD FOREST IN SOUTHWESTERN WISCONSIN,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00693

VEGETATION CHANGES AS A RESULT OF SOIL RIPPING ON THE RIO PUERCO IN NEW MEXICO,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04A.
W74-00696

IMPORTANCE, STATUS, AND BASIC PROBLEMS OF STUDIES IN PHYSICS OF SOIL WATER (ZNACHENIYE ISSLEDOVANIY FIZIKI POCHVENNYKH VOD, IKH SOVREMENNOYE SOSTOYANIYE I OSNOVNYYE ZADACHI),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
A. I. Budagovskiy.
Vodnyye Resursy, No 1, p 76-94, 1973. 39 ref.

Descriptors: *Soil physics, *Soil water, *Soil water movement, *Soil-water-plant relationships, *Evapotranspiration, Infiltration, Unsaturated flow, Porosity, Porous media, Model studies, Equations.
Identifiers: USSR, Water exchange.

Concepts and present state of knowledge of the physics of soil water are examined. Basic problems of investigations are movement of water in unsaturated porous media, and total evaporation and its components (transpiration of plants and evaporation from the soil). Ways of solving these problems are discussed, and individual applications of research results that show promise in the immediate years ahead are considered. (Josefson-USGS)
W74-00843

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME I.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00888

ORGANIC MATTER COMPOSITION UNDER DIFFERENT FOREST TYPES IN A DERNO-PODZOLIC ZONE, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Pedology.
For primary bibliographic entry see Field 02K.
W74-00984

VARIATION OF ABSORBED BASE COMPOSITION IN SODIC SOILS OF THE KARABACH PLAIN UNDER WATER FLUSH WITH AND WITHOUT THE ELECTRIC CURRENT, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics; and Moscow State Univ. (USSR). Dept. of Soil Melioration.
A. M. Shestopalov.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 4, p 78-81. 1972. (English summary).
Identifiers: Electric current, Gypsum, Plains, *Sodic soils, *USSR (Karabach plains), *Water flush, Absorption.

The effect of water flush on the variation of exhangeable bases composition of sodic soil remains the same when the electric current of gypsum was applied. The electric current increased the effect of gypsum on the exchangeable bases.--Copyright 1973, Biological Abstracts, Inc.
W74-00985

SOIL OF NORTH DAGESTAN, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Geography; and Moscow State Univ. (USSR). Dept. of Soil.
G. V. Dobrovol'skii, K. N. Fedorov, and N. V. Stasyuk.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 4, p 87-94. 1972. (English summary).
Identifiers: Alkaline soils, Carbonaceous soils, Gupsum, Humic Acid, Moisture, Nitrogen, Potassium, *Soils, *USSR (Gagestan), Organic compounds.

The soils of North Dagestan, USSR, possess a range of zonal characteristics: carbonaceous, alkaline, high in gypsum content and available K and N, but low in available P. Humus is rich in humic acid and insoluble organic compounds. These soils differ in their degree of hydromorphic alkalinity, moisture and physical properties.--Copyright 1973, Biological Abstracts, Inc.
W74-00986

A SIMPLE METHOD TO MEASURE THE PENETROMETER-RESISTANCE OF THE SOIL AND THE RELATIONSHIP BETWEEN THIS RESISTANCE, SOIL POROSITY AND SOIL WATER CONTENT,
L. De Leenheer.
Meded Fac Landbouwwet Rijksuniv Gent. Vol 37, No 1, p 1-7. 1972. Illus. (English summary).
Identifiers: Measurement, *Penetrometer resistance, *Soil water, *Soil porosity.

In silt soil a highly significant regression was found between the data for 2 depths, for the relationship with total soil porosity and soil water content. The method is described.--Copyright 1973, Biological Abstracts, Inc.
W74-00987

EFFECT OF THE POLYMER K-4 ON THE RESISTANCE OF LIGHT CHESTNUT SOIL COVER TO EROSION BY WATER, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics.
For primary bibliographic entry see Field 04D.
W74-00988

VARIATION IN SOIL FACTORS AND CROP YIELD ON A SANDY SOIL RICH IN ORGANIC MATTER, (IN NORWEGIAN),
For primary bibliographic entry see Field 03F.
W74-01051

SEEPAGE FLOWS--FIELD DATA MEASUREMENTS FOR EVALUATION OF POTENTIAL CONTRIBUTION OF FERTILIZERS TO GROUNDWATER POLLUTION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 05B.
W74-01054

EFFECT OF DETERGENT APPLICATION ON THE GROWTH OF CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 03C.
W74-01057

ON THE STELLARIO-ALNETUM GLUTINOSAE (MIKYSKA 1944) LOHMEYER 1957 IN THE CZECH SOCIALISTIC REPUBLIC (CSR),
Ceskoslovenska Akademie Ved, Prague. Biologicky Ustav.
For primary bibliographic entry see Field 02I.
W74-01078

AN EQUATION FOR DESCRIBING WATER VAPOR ADSORPTION ISOTHERMS OF SOILS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
D. H. Fink, and R. D. Jackson.
Soil Science, Vol 116, No 4, p 256-261, October 1973. 2 fig, 1 tab, 22 ref.

Descriptors: *Adsorption, *Water vapor, Soil moisture, Soil water movement, Diffusion, Equations, Isotherms.

An adsorption isotherm equation describes sigmoidal Type II adsorption isotherms such as the adsorption of water on soils and clays. The equation was statistically evaluated on 52 published adsorption isotherms; 49 of the 52 had correlation coefficients greater than 0.99, and the lowest was 0.96. The equation also can predict the complete isotherm from only a few scattered data points. Other uses include differentiation of the isotherm as is needed in vapor diffusion studies, and integration of the isotherm as is needed in certain thermodynamic relationships associated with the adsorption of vapors on soil surfaces. (Knapp-USGS)
W74-01087

MOVEMENT OF SALT AND WATER IN RELATIVELY DRY SOILS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
J-Y. Parlange.
Soil Science, Vol 116, No 4, p 249-255, October 1973. 4 fig, 9 ref.

Descriptors: *Soil water movement, *Solutes, *Diffusion, *Salts, Fertilizers, Path of pollutants, Osmosis, Mass transfer, Soil moisture.

When the surface of a relatively dry soil is covered with salt crystals, a wet layer containing salt in solution grows under the crystals. The water in the wet layer has little movement and salt diffuses into it from the surface. Water and salt concentration vary almost discontinuously between the wet layer and the drier soil underneath. These discontinuities are maintained by a strong osmotic potential which affects water movement in the vapor phase. (Knapp-USGS)
W74-01088

2H. Lakes

A EUTROPHICATION MODEL OF THE WHITE RIVER BASIN ABOVE BEAVER RESERVOIR IN NORTHWEST ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W74-00555

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION OF FRESHWATER ALGAE: AN EXPERIMENTAL STUDY. IV. GROWTH OF TEST SPECIES IN NATURAL LAKE WATERS, AND CONCLUSION,
Michigan State Univ., East Lansing. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00641

THE STANDING CROP AND PRIMARY PRODUCTIVITY OF THE PHYTOPLANKTON OF ABBOT'S POND, NORTH SOMERSET,
Bristol Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00651

ALGAE ABSTRACTS, A GUIDE TO THE LITERATURE, VOLUME 1 TO 1969; VOLUME 2, 1970-1972.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 05C.
W74-00704

LAKE WASHINGTON,
For primary bibliographic entry see Field 05C.
W74-00739

PROJECT REPORT FOR VENTURA COUNTY PLANNING DEPARTMENT AND CASITAS MUNICIPAL WATER DISTRICT ON WATERSHED DEVELOPMENT IMPACT ON LAKE CASITAS.
Montgomery Research, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 05B.
W74-00752

CHEMICAL AND BIOLOGICAL PATTERNS IN THE LOWER COLORADO RIVER SYSTEM,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 05C.
W74-00760

SOME COMPARISONS IN THE THERMAL STRUCTURE OF LAKES WOOD, KALAMALKA, OKANAGAN, SKAHA, AND OSOYOOS, BRITISH COLUMBIA,
Departmet of the Environment, Burlington (Ontario). Centre for Inland Waters.
J. O. Blanton.
Journal of the Fisheries Research Board of Canada, Vol 30, No 7, p 917-925, July 1973. 6 fig, 5 tab, 8 ref.

Descriptors: *Lakes, *Canada, *Epilimnion, *Hypolimnion, *Heat transfer, *Thermocline, *Thermal capacity, *Seasonal, Thermal properties, Aquatic life, Fish, Influent streams, Inflow, Groundwater, Surface waters, Limnology, Aquatic environment, Freshwater, Hydrology.
Identifiers: Lake Wood (Canada), Lake Kalamalka (Canada), Lake Okanagan (Canada), Lake Skaha (Canada), Lake Osooyos (Canada).

The rate of change of heat contents in five British Columbian lakes was investigated, and the relative ability of each lake to transfer heat vertically to warm its hypolimnion was studied. Rates of hypolmnion heatup ranged from 0.06 C per month in Okanagan to 0.54 C per month in the north basin of Osoyoos. All lakes reached maximum static stability through the thermocline in late August, except for northern Osoyoos which reached its maximum somewhat earlier. Maximum heat contents ranged from 18,100 cal/sq cm in Wood Lake to 33,300 cal/sq cm in Lake Okanagan. Maximum heat content values were observed in late August in all lakes. A direct relationship was found between the hypolimnetic warming rates and the maximum stability in the thermocline regions. However, the relatively low rate of Lake Wood implies an external cooling source, such as groundwater influx. The late summer increase in epilimnion volume in Lake Wood and the corresponding entrainment of nutrients from the hypolmnion to the epilimnion appear to control the amount of production observed at that time. (Brown-IPC)
W74-00769

OBSERVATIONS OF LANGMUIR CIRCULATIONS IN LAKE ONTARIO,
McMaster Univ., Hamilton (Ontario). Dept. of Biology.
G. P. Harris, and J. N. A. Lott.
Limnology and Oceanography, Vol 18, No 4, p 584-589, July 1973. 5 fig, 1 tab, 18 ref.

Descriptors: *Lake Ontario, *Water circulation, *Currents (Water), Winds, Waves (Water), Convection.
Identifiers: *Langmuir circulation.

The downwelling velocities associated with Langmuir circulations in Lake Ontario correlate well with wind speed under surface cooling. With surface heating the correlations with wind speed are poor and calculations of a stability parameter indicate a different proportionality. Surface slicks and capillary wave damping are in operation at the point of downwelling. (Knapp-USGS)
W74-00831

BIOLOGICAL INVESTIGATIONS OF LAKE WINGRA,
Wisconsin Univ., Madison. Lab. of Limnology.
For primary bibliographic entry see Field 05C.
W74-00833

SOME IMPORTANT PROBLEMS IN MODERN LIMNOLOGY (O NEKOTORYKH VAZHNYKH ZADACHAKH SOVREMENNOGO OZEROVEDENIYA),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
S. V. Kalesnik.
Vodnyye Resursy, No 1, p 36-42, 1973.

Descriptors: *Limnology, *Lakes, Freshwater, Water levels, Water balance, Eutrophication, Water pollution effects, Forecasting.
Identifiers: *USSR.

The varied role of lakes in the Soviet economy is described, and relations between lakes and the surrounding environment are examined. Basic problems in modern limnology are discussed with emphasis on application of complex methods of investigation. These problems include determination of total water balance of freshwater lakes in the USSR; study of cyclic water-level fluctuations of lakes; control of lake pollution and eutrophication; and forecast of lake changes. To solve these problems, training of manpower for research is needed. (Josefson-USGS)
W74-00839

HYDROCHEMICAL ZONALITY OF URAL LAKES (GIDROKHIMICHESKAYA ZONAL'NOST' OZER URALA),
M. N. Yeremeyeva, L. Ye. Chernyayeva, and A. M. Chernyayev.
Vodnyye Resursy, No 1, p 43-54, 1973. 1 fig, 9 tab, 2 ref.

Descriptors: *Lakes, *Limnology, *Water chemistry, *Inorganic compounds, *Water types, Water quality, Water analysis, Correlation analysis, Maps.
Identifiers: USSR, *Ural area.

Data on chemical composition of lake waters in the Ural area are based on approximately 3,000 chemical analyses of water samples obtained from hydrochemical investigations of more than 700 different lakes in 1956-71. By degree of mineralization, Ural lakes are classified into 5 categories: (1) freshwater lakes with a total mineralization less than 0.5 g/liter; (2) freshwater lakes with a total mineralization between 0.5 and 1 g/liter; (3) brackish-water lakes with a total mineralization between 1 and 5 g/liter; (4) saline lakes with a total mineralization between 5 and 35 g/liter; and (5) brine lakes with a total mineralization greater than 35 g/liter. Six hydrochemical lake zones are identified in the Ural area and adjoining regions: (1) zone of bicarbonate freshwater; (2) zone of bicarbonate-chloride freshwater and, occasionally, brackish water; (3) zone of chloride-bicarbonate brackish water; (4) zone of chloride-sulfate saline water; (5) zone of chloride saline and brine waters; and (6) zone of waters of varied chemical composition and mineralization. Hydrochemical zonality of lakes in the area is mapped, and parameters of lognormal distribution of Ca, Mg, Na+K, HCO3, SO4, and Cl concentrations in lake waters of different zones are tabulated. (Josefson-USGS)
W74-00840

ROTIFERS OF THE NEAR BOTTOM ZONE OF LAKES MIKOLAJSKIE AND TAITOWISKO,
Institute of Public Utility Services, Warsaw (Poland). Lab. of Hydrobiology.
H. Klimowicz.
Pol Arch Hydrobiol. Vol 19, No 2, p 167-178, 1972. Illus.
Identifiers: *Bottom zones (Lakes), Lakes, *Poland (Lakes Mikolajskie-Taitowsko), *Rotifers.

Evidence is supplied that near the lake bottom the benthic rotifers species are autochthonous, whereas eurytopic and planktonic ones immigrate from other lake zones chiefly from epilimnion. During the warm season the quantitative and qualitative species composition of rotifers over lake bottom is affected mainly by eurytopic and planktonic species. The number of benthic did not considerably change during the study period. The number of species and abundance of individuals in the near-to-bottom zone decreased with increasing depth.--Copyright 1973, Biological Abstracts, Inc.
W74-00935

NEW SPECIES OF FREE-LIVING NEMATODES FROM LAKE BAIKAL, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
S. Ya. Tsalolikhin.
Zool Zh. Vol 51, No 10, p 1559-1563. 1972. Illus. (English summary).
Identifiers: Eudiplogaster-Baicalensis, Lakes, Mononchus-Niddensis, *Nematodes, New species, Tobrilus-Fortis, *Tobrilus-Incognitus, *USSR (Lake Baikal).

Tobrilus incognitus differs from the morphologically close species primarily in 5 similar genital papillae and greater separation of the oral capsula from stomal pouches. Tobrilus fortis has very small rudimentary cephalic chaeta, weakly differentiated stoma and thick, massive body. Eudiplogaster baicalensis has very short cephalic chaeta, extensive stoma with 12-14 ridges armed with 2 large dorsal and 1 small ventral teeth. The diagnosis of Monochus niddensis Skwarra, 1922 is broadened.--Copyright 1973, Biological Abstracts, Inc.
W74-00976

STUDY OF ALGAE USED AS FOODS IN THE VALLEY OF MEXICO, (IN SPANISH),
Universidad Nacional Antonoma de Mexico, Mexico City.
M. M. Ortega.
Rev Latinoam Microbiol. Vol 14, No 2, p 85-97. 1972. Illus.
Identifiers: *Algae, Amomoxtle, Chroococcus-Turgidus, Geology, History, *Mexico, Nostoc-Commune, Phormidium-Tenus, Pleistocene, *Tecuitlatl, Valleys, Human food supplements.

The historical antecedents of the 'tecuitlatl' or 'cocolin' and 'amomoxtle' which constituted a human food supplement when the peoples of Anahuac flourished are reviewed. The evolution of the Great Lake of the Valley of Mexico from the Pleistocene to the present day is described in parallel with the use of these products, including toponymia to which 'tecuitlatl' gave its origin because of its economic importance. The results of studies in markets and present-day lakes of the Valley of Mexico are presented, as well as the present-day preparation of 'tecuitlatl.' Finally the principal components of these products are described: Phormidium tenue, Chroococcus tur-

gidus and Nostoc commune.--Copyright 1973, Biological Abstracts, Inc.
W74-00982

BETA RADIOACTIVITY OF PERIPHYTON IN CERTAIN DAM RESERVOIRS,
Instytut Gospodarki Kommunalnej, Chorzow (Poland). Zaklad Radiol. GOP.
For primary bibliographic entry see Field 05B.
W74-00993

DISTRIBUTION OF MONODACNA COLORATA (EULAMELLIBRANCHIATA, CARDIIDAE) IN THE SAMARSKY BAY OF THE ZAPOROZHSKY WATER RESERVOIR (IN RUSSIAN),
Dnepropetrovskii Gosudarstvennyi Universitet (USSR). Institut Gidrobiologii.
Yu. K. Gaidash, and I. P. Lubyanov.
Zool Zh, Vol 51, No 9, p 1402-1404, 1972, English summary.
Identifiers: Bays, *Cardiidae (Distribution), Eulamellibranchiata, *Monodacna-colorata, Reservoirs, Samarsky Bay (USSR), *Zaporozhsky Reservoir (USSR).

After the introduction of Monodacna, its development proceeded very slowly for almost 10 yr. A rather wide distribution of Monodacna in the Samarsky Bay of the Zaporozhsky Water Reservoir (USSR) was determined by a recently arisen favorable hydrochemical regime, optimal depths with oozed grounds, and abundance of food, detritus and phytoplankton. In 1971 the numbers of adult specimens amounted to 120/x m2 with the biomass of 782 g/m2 off the right bay coast and somewhat less off the left coast. In the bay Monodacna occurs within the mass of Dreissena (22,460-31,920 specimens/m2); together they serve as a habitat for amphipods. Monodacna rapidly became an important component of the ration of commercial fishes-benthophages and its mass development will, undoubtedly, contribute to an increase of fish productivity of the water body.--Copyright 1973, Biological Abstracts, Inc.
W74-00999

THE EFFECT OF NUTRIENTS ON THE GROWTH OF BACTERIAL POPULATION IN WATER,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
For primary bibliographic entry see Field 05C.
W74-01001

STUDIES OF BIOLOGICAL ENERGY BALANCE AND BIOLOGICAL PRODUCTIVITY IN THE USSR LAKES (IN RUSSIAN),
G. G. Vinberg.
Ekologiya, Vol 3, No 4, p 5-18, 1972, Illus.
Identifiers: *Bacterial growth, Biological studies, Energy balance, Lakes, *Primary productivity, *USSR.

A survey of hydrobiological studies that are concerned with the biological energy balance and biological productivity in USSR lakes is given. The primary productivity of water resources is listed, as well as formulas used in calculations of bacterial growth and the intensity of volumetrical changes.--Copyright 1973, Biological Abstracts, Inc.
W74-01009

ECOLOGICAL STUDY OF THE CYANOPHYTES AND CHLOROPHYTES IN SOME PONDS AROUND BRUGES: DETERMINATION OF THE DEGREE OF TROPHISM IN ACCORDANCE WITH SCHROEVER'S PD QUOTIENT, (IN GERMAN),
Ghent Rijksuniversiteit (Belgium).
For primary bibliographic entry see Field 05C.
W74-01012

ECOLOGICAL DATA OF MIRE VEGETATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Petrozavodsk. Inst. of Biology.
N. A. Belousova.
Ekologiya. Vol 3, No 4, p: 90-93, 1972, Illus.
Identifiers: Climates, *Ecological data, Geomorphology, *Mire vegatation, Nutrients, *Trophic stages, Vegetation, Acidity.

An ecological study of the mire vegetation was conducted during June-Aug. 1968-1970. The area contains 20-60% mire which results in a high climatic coefficient and geomorphological features. The water is hard (0.28-0.48 mg-ekv) and of low mineral content (less than 50 mg/1). This accounts for a low nutritional value of the mire, and thus a large number of mires are in the mesothrophic or oligothrophic stage of development. An increase in substrate acidity causes a corresponding decrease in a quantity of plant species and vice versa.--Copyright 1973, Biological Abstracts, Inc.
W74-01014

SEDGE ASSOCIATIONS FROM THE OZUNCA SWAMP, (IN RUMANIAN),
Brasov Univ. (Rumania).
M. Danciu.
Stud Cercet Biol Ser Bot. Vol 24, No 2, p: 83-94. 1972, Illus.
Identifiers: Acidity, Minerals, Peaty soils, *Romania (Ozunca swamp), *Sedge associations, Soils, *Swamps, *Caricetum species.

Sedge associations (3) from a peat containing marsh supplied with mineral water from the Baraolt mountains, Romania, are analyzed. The Caricetum diandrae Jon. 1932, found only in a small area (0.25 ha) on peaty soil of pH 6.4, is marked by the lack of many species characteristic of the order and association. The Caricetum caespitosae Klika et Smarda 1941 is located on the edge of the moor. Caricetum rostratae Ruebel is represented in 2 phytocenoses on large deposits of acid peat (pH 6.3).--Copyright 1973, Biological Abstracts, Inc.
W74-01016

SOME PHYTOPLANKTON CHARACTERISTICS IN COOLER BASINS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 05C.
W74-01017

EFFECT OF FISH ON THE BOTTOM OF RESERVOIRS,
Y. Eren, A. Yashouv, and Y. Langer.
Bamidgeh. Vol 24, No 2, p: 40-48, 1972, Illus.
Identifiers: Bottom sediments, Fish, *Israel, *Oscillatoria-Chalybea, *Reservoirs, Salmon, *Tilapia-Aurea, *Cyanphyta.

Tilapia aurea affected the composition of bottom sediments in the experimental pond. In sections with fish the sediments contained 35% less organic matter. It is suggested that both feeding habits and the mechanical activity of the fish caused this change. Presence of fish affected the composition of benthic algae. More filamentous blue-green algae developed in sections without fish. The fish caused a significant decrease in the amount of submerged vegetation. There was no significant difference in the quantity and composition of bottom animals or in the amount of benthic algae between the treated and control areas. The results from the experimental pond verify the theory that the fish in the Tsalmon and Beth Netufa (Israel) reservoirs are involved in the reduction of taste and odor caused by the blue-green alga Oscillatoria chalybea.--Copyright 1973, Biological Abstracts, Inc.
W74-01020

REMARKS ON THE STOCKING OF THE DAM RESERVOIR AT PRZECZYCE WITH LAKE TROUT SALMO TRUTTA M LACUSTRIS L,
Polish Academy of Sciences, Krakow. Zakland Biologii Wod.
For primary bibliographic entry see Field 08I.
W74-01072

BOTTOM FAUNA OF DEAD VISTULA,
Warsaw Univ. (Poland). Zoological Inst.
For primary bibliographic entry see Field 05C.
W74-01073

INTRODUCTION TO STUDY 'IN SITU' OF PLANKTON ECOLOGY IN LAKE GENEVA, (IN FRENCH),
O. Gonet.
Bull Soc Vaudoise Sci Nat. Vol 71, No 5, p 245-268, 1972. Illus. (English summary),
Identifiers: Conductivity, Ecology, Lakes, *Nitrogen, *Phosphorus, *Phytoplankton, *Switzerland (Lake Geneva), Temperature, Transparency.

Research concerning the relationship between water characteristics (N and P contents, conductivity, temperature, Secchi disc readings) and phytoplankton in the lake Leman (L. Geneva, Switzerland) is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01079

ALGAE FEEDING OF YOUNG OF CERTAIN FISH SPECIES OF THE KAIRAK-KUMSKII RESERVOIR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 08I.
W74-01082

2I. Water in Plants

BIOTA OF FRESHWATER ECOSYSTEMS IDENTIFICATION MANUAL NO. 10 GENERA OF FRESHWATER NEMATODES (NEMATODA) OF EASTERN NORTH AMERICA,
Purdue Univ., Lafayette, Ind. Dept. of Entomology.
V. R. Ferris, J. M. Ferris, and J. P. Tjepkema.
Copy available from GPO Sup Doc as EP1.16: 18050 ELD 01/73, $4.00; microfiche from NTIS as PB-224 830, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, January 1973. 38 p, 14 fig, 17 ref. EPA Project 18050 ELD 01/73. 14-12-894.

Descriptors: *Aquatic fauna, *Nematodes, Preservation, *Biota, Data collections, *NorthAmerica.
Identifiers: *Identification manual, Illustrated key.

An illustrated key to 56 genera of freshwater nematodes of eastern North America is given. Notes are included on the significance of nematodes in freshwater ecosystems, collecting and isolating nematodes, slide preparation and counting, and identification and use of the key. (See also W73-13736 thru W73-13744, and W74-00564) (EPA)
W74-00563

NEMATODA, ACANTHOCEPHALA AND HIRUDINEA IN FISHES FROM THE RIVER HRON (CZECHOSLOVAKIA), (IN CZECH),
Slovenska Akademie Vied, Kosice (Czechoslovakia). Helmintologicky Ustav.
R. Zitnan.
Stud Helminthol, 2, p 21-32, 1968, Illus, English summary.
Identifiers: *Acanthocephala, Cottus-gobio, Cottus-poecilopus, *Czechoslovakia (River Hron), Fishes, *Hirudinea, Metabronema-truttae, *Ne-

matoda, Neoechinorhynchus-rutili, Pike, Piscicola-geometra, Pomphorhynchus-laevis, Pseudoechinorhynchus-clavula, Raphioascaris-acus, Rivers, Salmonidae.

Fishes (851) belonging to 47 species were examined. Of these fishes 115 (13.51%) were infested with nematodes, 290 (34.07%) with acanthocephala and 13 (1.52%) with hirudinea. From the epizootiological point of view Raphidascaris acus and Metabronema truttae are of particular importance being dangerous mainly for pikes and salmonidae. Particular attention should be given to the acanthocephala which have a characteristic ability to parasitize in a wide range of hosts and which belong to the most pathogenous fish helminths. Pomphorhynchus laevis found in 37 fish species coming from 12 localities, Neoechinorhynchus rutili found in 14 fish species from 3 localities and Pseudochinorhynchus clavula found in 7 fish species from 6 localities present the widest ecological variance. At the upper flow of the river Hron P. clavula appears to be important in the salmonidae; it is carried and distributed mainly by Cottus gobio and C. poecilopus both of which are an essential food element of larger trouts. Of the 2 hirudinea found Piscicola geometra is the most important and the most widely distributed. The majority of both economically important and unimportant fishes of the river Hron present helminth hosts of epizootiological importance even for fishes bred on fish farms of the Hron river basin.--Copyright 1973, Biological Abstracts, Inc.
W74-00679

PRESSURE BOMB MEASURES CHANGES IN MOISTURE STRESS OF BIRCHLEAF MOUNTAINMAHOGANY AFTER PARTIAL CROWN REMOVAL,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. J. Campbell, and C. P. Pase.
USDA Forest Service Research Note RM-221, 1972. 4 p, 3 fig, 8 ref.

Descriptors: *Moisture stress, *Chaparral, Vegetation, *Arizona, Southwest U.S., *Watershed management, Demonstration watersheds, *Birch trees.
Identifiers: *Pressure bomb measurement, Mountainmahogany (Cercocarpus betuloides), Crown reduction, Leaf mass, *Vegetation management, Canopy leaves.

Leaf mass of mountainmahogany (Cercocarpus betuloides) was reduced 22, 36, 41, and 66 percent. Forty-one percent or more leaf-mass removal caused highly significant reductions in plant-moisture stress but no significant reductions in stress occurred when leaf-mass removal was 36 percent or less. (Forest Service)
W74-00681

CESTOIDEA OF FISH IN THE RIVER HRON (CZECHSLOVAKIA), (IN CZECH),
Slovenska Akademie Vied, Kosice (Czechoslovakia). Helmintologicky Ustav.
R. Zitnan.
Stud Helminthol, 2, p 11-20, 1968, Illus, English summary.
Identifiers: Biacetabulum-appendiculatum, Caryophyllaeus-brachycollis, *Cestoidea, *Czechoslovakia (River Hron), *Epizootiology, Fish, Proteocephalus, Rivers.

Fishes (851) belonging to 47 species were examined and 16 Cestoidea species were found. Biacetabulum appendiculatum, Caryophyllaeus brachycollis and Proteocephalus sp. are species which were not previously described from Czechoslovakia. The hosts, location, distribution and worm burden are reported and descriptions and drawings of lesser known species given. The epizootiological significance of the more important species is indicated.--Copyright 1973, Biological Abstracts, Inc.
W74-00689

POPULATION DYNAMICS OF HERBACEOUS COMMUNITIES OF PILANI (RAJASTHAN),
S. S. Coll., Alipur (India). Dept. of Botany.
V. R. Babu.
Jap J Ecol. Vol 21, No 3/4, p 87-95. 1971. Illus.
Identifiers: *Borreria-Articularis, Cenchrus-Biflorus, *Herbaceous communities, *India (Rajasthan), Population (Plants), Sandy, Soils, Weeds, Hydrogen ion concentration.

Population dynamic of herbaceous communities of certain areas around Pilani (India) were studied during the 1 growth season (monsoon) of 1968. The analysis of habitat factors and interrelationships between the habitat factors and the Borreria articularis population were also studied. Among about 10 herbaceous associates in various localities, B. articularis and Cenchrus biflorus are closely associated. An increase in the associates of the grass group reduced the B. articularis populations. In cultivated fields, the ratio between weeds and the crop plants is found to be 7:1. Of the 7 weeds for every crop plant, 3 are B. articularis. The population of B. articularis is limited by the fine sand content. The plants' preference for sandy soils with pH near neutral is established. Populations showed negative logarithmic relationship with soil pH from 7.3 to 7.7.--Copyright 1973, Biological Abstracts, Inc.
W74-00714

XYLEM WATER POTENTIALS AND STOMATAL RESISTANCE IN BOG PLANTS: ECOLOGICAL IMPLICATIONS,
New Hampshire Univ., Durham. Dept. of Botany.
P. J. Marchand.
Center for Northern Studies, Wolcott, Vermont, Contribution No 1, (1972). 18 p, 1 fig, 4 tab, 10 ref. OWRR A-031-NH (2).

Descriptors: *Plant morphology, *Water storage, *Transpiration, *Xylem, *Stomata, Bogs, Vegetation, Wetlands, Soil water, *New Hampshire, Blueberries, Maple trees, Birch trees, Vermont, Tamarack, Moisture uptake, Evaporation.
Identifiers: *Durham (NH), *Plant water potential, Leatherleaf, Maleberry, Black chokeberry, Black alder, Red maple, Sheep laurel, Low-bush blueberry, Paper birch, Labrador tea, Wolcott (Vt.).

Both stomatal resistance to the diffusion of water vapor and xylem water potential of several vegetation species in a bog were measured. Comparison was made of differences in plant water potential within the bog, between a bog and an upland community, and between different habitats of a single species. Air temperature, relative humidity, evaporation, and soil water content (with soil type) were measured. To determine amount of variation of stomatal resistance within bog community, a three-way model analysis of variance was used to test independently, stomatal resistance values on leaves, individuals, species, and days. Within one bog, xylem water potentia.s ranged from early morning high of between -1.7 and -4.0 bars for all species, to a low exceeding -22 bars for individuals of Acer rubrum, Ilex verticillata, and Lyonia ligustrina. Ledum groenlandicum in its upland habitat showed higher water potential levels than its counterpart in a boreal swamp. Whatever the internal resistance source, obviously the concomitant low xylem water potentials are bog characteristics. What was observed, is simply a range of plant water potentials reflecting potential gradient necessary to overcome flow resistance presumably imposed by some environmental factor other than soil-water status. (Jones-Wisconsin)
W74-00719

MALEZAS ACUATICAS, AQUATIC WEEDS, J. M. BRISTOW,
Colombian Agricultural Inst., Bogota.
For primary bibliographic entry see Field 04A.
W74-00736

JOJOBA AND ITS USES, AN INTERNATIONAL CONFERENCE, JUNE 1972.
For primary bibliographic entry see Field 03F.
W74-00756

REPTILES OF THE CHESAPEAKE BAY REGION,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00918

WATERFOWL OF THE CHESAPEAKE BAY,
Bureau of Sport Fisheries and Wildlife, Jamestown, N. Dak. Northern Prairie Wildlife Research Center.
For primary bibliographic entry see Field 02L.
W74-00919

EFFECTS OF WATER AND HEAT ON SEEDLING EMERGENCE,
Institute for Land and Water Management Research, Wageningen (Netherlands).
For primary bibliographic entry see Field 03F.
W74-00930

RARE AND NEW SPECIES OF ROTIFERS IN THE FAUNA OF POLAND,
Polish Academy of Sciences, Warsaw. Inst. of Experimental Biology.
M. Lewkowicz.
Acta Hydrobiol. Vol 14, No 2, p 143-148, 1972. Illus.
Identifiers: *Fauna, Lecane-Bifurca, Lepadella-Numpha, *Poland, Records, *Rotifers, Species, Trichocerca-Jenningsi, Volga-Spinifera.

Planktonic and littoral Rotatoria (25 spp.) which are rare or new for the fauna of Poland were identified. These species were found in the fish-ponds belonging to the Laboratory of Water Biology of the Polish Academy of Sciences at Golysz. The following species are new for the fauna of Poland: Volga spinifera Skorikov 1903, Lepadella nympha Donner 1943, Lecane bifurca (Bryce) 1892, Trichocerca jenningsi Voigt 1957.--Copyright 1973, Biological Abstracts, Inc.
W74-00970

THE RESPONSES TO CURRENT FLOW OF TWO STREAM DWELLING TRICLADS, CRENOBIA ALPINA (DANA) AND POLYCELIS FELINA (DALYELL),
Waterloo Univ. (Ontario). Dept. of Biology.
M. A. Lock.
Oecologia (Berl). Vol 10, No 4, p 313-320. 1972. Illus.
Identifiers: Apparatus, *Crenobia-Alpina, Flow, *Polycelis-Felina, Stream, *Triclads.

An apparatus is described which allows triclads to choose between the fast and slow regions of a stirred tank. In the absence of a stone substratum C. alpina preferred or tolerated higher current speeds than P. felina, this effect was enhanced when a stone substratum was added to the apparatus. These results indicate that the absence of P. felina from the steep gradient regions of streams could be accounted for by its preference for slower micro-currents. Conversely the presence of C. alpina in steep gradient regions could be accounted for by its preference for or tolerance to higher micro-currents.--Copyright 1973, Biological Abstracts, Inc.
W74-00971

LIST OF THE GASTROPODS OF THE ST. LAWRENCE RIVER IN THE REGION OF GENTILLY, (IN FRENCH),
Queen's Univ., Kingston (Ontario).

G. Vaillancount, and M. Dingemann.
Sterkiana. 48. p 17-29. 1972. Illus. (English summary).
Identifiers: *Canada, *Gastropods, Rivers, *St. Lawrence River.

A list of 23 spp. from 7 families is prepared from quantitative field surveys made 1970-72 at 7 stations. Tables give the counts/m2 for each month.--Copyright 1973,Biological Abstracts, Inc.
W74-00973

KINONCHULUS SATTLERI N.G.N.SP. (ENOPLIDA, TRIPYLOIDEA), AN ABERRANT FREELIVING NEMATODE FROM THE LOWER AMAZONAS,
Institut fuer Meeresforschung, Bremerhaven (West Germany).
F. Riemann.
Veroeff Inst Meeresforsch Bremerhaven. Vol 13, No 2, p 317-326. 1972. Illus.
Identifiers: *Amazonas, *Brazil, Enoplida, Genus, Kinonchulus-Sattleri, *Nematode, New species, Tripyloidea.

Kinonchulus, a member of the primitive Enoplida family Onchulidae, has a remarkable protrusible pharynx outfitted with long pricks and rows of hooks. It shows a striking resemblance to the head of kinorhynchs or nematomorph larvae. Relationships to Tripylidae and Deptherophoroidae are assumed.--Copyright 1973, Biological Abstracts, Inc.
W74-00974

GREEFFIELLA MOPPA SP. N. FROM THE SKAGERRAK (NEMATODA, DESMOSCOLECIDAE), (IN GERMAN),
Institut fuer Meeresforschung, Bremerhaven (West Germany).
M. Schrage.
Veroeff Inst. Meeresforsch Bremerhaven. Vol 13, No 2, p 327-337. 1972. Illus. (English summary).
Identifiers: *Desmoscolecidae, Greeffiella-Beatlei, Greeffiella-Dasyura, *Greeffiella-Moppa, Greeffiella-Oxycaudata, *Nematoda, New species, Skagerrak, Species, Synonymy.

This new species was collected at depths from 220-310 m. It is characterized by subventral setae in the male. There is evidence that preanal and postanal subventral copulatory organs of other Greeffiella species derived from such subventral setae. The synonymy of G. oxycaudata (Greeff 1869) is discussed; specimens mentioned under this name by Gerlach are transferred to G. beatlei Lorenzen 1969 and G. dasyura Cobb 1922.--Copyright 1973, Biological Abstracts, Inc.
W74-00975

NEW SPECIES OF FREE-LIVING NEMATODES FROM LAKE BAIKAL, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
For primary bibliographic entry see Field 02H.
W74-00976

NEMATODES IN DAMS OF ZEMPLINSKA SIRAVA, (IN CZECH.),
A. Saly.
Zb Slov Nar Muz Prir Vedy. Vol 16, No 2, p 19-25. 1970.
Identifiers: Aphelenchoides-Parietinus, *Czechoslovakia (Zemplinska Sirava), Dams, *Nematodes, New species, *Panagrobelus-Coronatus, Records, Rhabditis-Brevispina, Fodder beams, Fodder grasses.

Soil samples from grass root soil and from roots of other plants (fodder beans) growing on slopes of dams contained 29 spp. of soil nematodes belonging to 19 genera and 9 families. The species Panagrobelus coronatus was new for Czechoslovakia. On 13 different fodder grasses and plants the density of nematodes fluctuated from 30-625 specimens/100 g soil with Aphelenchoides parietinus and Rhabditis brevispina the most numerous species.--Copyright 1973, Biological Abstracts, Inc.
W74-00977

MOISTURE BALANCE IN THE OAK FORESTS ON THE NORTHERN DONETS RIGHT BANK, (IN RUSSIAN),
For primary bibliographic entry see Field 04A.
W74-00983

NATURAL FACTORS OF ACTIVATION OF PLAGUE EPIZOOTIAE IN SIBERIA, (IN RUSSIAN),
G. S. O. Letov.
Zool Zh. Vol 51, No 7, p 1041-1047. 1972. Illus. (English summary).
Identifiers: *Epizootiae, Parasites, *Plague, *Sousliks, USSR (Siberia-Mongolia).

The zone of plague natural foci in Mongolia and South Siberia is located mainly in regions which did not suffer from Pleistocene glaciation. The formation of plague biocoenosis proceeded under the effect of sharply continental dry climate. During the dry spring season the course of Plague epizootiae among long-tailed Siberian and Daurian sousliks is not intensive. A sharp increase in the development of epizootiae coincides with the appearance of young animals going out of burrow during the season of maximal precipitation and resumption of plant vegetation. The optimum of life conditions for rodents and ectoparasites is prerequisite for activation of epizootiae.--Copyright 1973, Biological Abstracts, Inc.
W74-00990

CALLUS TISSUE CULTURE FROM THE VIEWPOINT OF WATER RELATIONSHIPS (IN GERMAN),
Komenskeho Universita, Bratislava (Czechoslovakia).
S. Klenovska.
Acta Fac Rerum Nat Univ Comenianae Physiol Plant, 5, p 101-105, 1972, Illus, English summary.
Identifiers: *Callus tissue cultures, *Nicotiana-tabacum, Evaporation, Water potential.

Outer callus tissue in Nicotinana tabacum cv. 'Samsun' cultures had a lower water potential than inner tissue, due to evaporation.--Copyright 1973, Biological Abstracts, Inc.
W74-00995

EFFECT OF RETARDANT CHLOROCHOLINE CHLORIDE ON CONTENT OF PROTEIN COMPONENTS IN PLANT LEAVES DURING DROUGHT (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
For primary bibliographic entry see Field 03F.
W74-00996

SOME ECOLOGICAL DATA ON FRESHWATER OSTRACODS OF THE TEMPORARY AND PERMANENT WATERS IN THE VICINITY OF BUCHAREST (IN RUMANIAN),
Academia R. S. R., Bucharest. Institutul de Biologie.
F.-E. Caraion.
Stud Cercet Biol Ser Zool, Vol 24, No 3, p 237-241, 1972, Illus, English summary.
Identifiers: Cypris-pubera, Ecological data, Eucypris-lutaria, Eucypris-virens, Heterocypris-incongruens, *Ostracods, *Romania (Bucharest), *Cyprididae.

Data concerning the species of freshwater Ostracoda (Cyprididae) which usually populate the temporary and permanent water situated on the territory of Bucharest, Romania as well as in its peripheric area, are presented. The dominance of certain species such as Cypris pubera, Eucypris virens, Eucypris lularia and Heterocypris incongruens in the spring swamps and ditches is shown.--Copyright 1973, Biological Abstracts, Inc.
W74-01000

EFFECT ON FLOOD INTRODUCED PLANTS IN THE DESNA RIVER FLOOD PLAIN NEAR OSTRA, (IN UKRAINIAN),
For primary bibliographic entry see Field 04A.
W74-01013

PRIMARY PRODUCTION-PHYTOPLANKTON RELATIONSHIP IN THE CRAPINA-JIJILA COMPLEX IN THE FLOOD CONDITIONS OF 1970, (IN RUMANIAN),
Bucharest Univ. (Rumania). Faculty of Biology.
L. Gavrila, I. Chiosila, and A. Schneider.
Stud Cercet Biol Ser Bot. Vol 24, No 2, p: 141-157, 1972, Illus.
Identifiers: Basins, Floods, *Phyto plankton relationships, Pisciculture, Plankton, *Primary production, *Romania (Crapina-Jijila complex), Zooplankton.

Under the flood conditions of 1970, primary production was provided primarily by phytoplankton. This attests to the very advantageous nature of this primary production which joined the trophic flow of the basin at the very moment of its formation. It was immediately taken over by the secondary factors of the trophic chain. The piscicultural arrangement of the Jijila basin (Romania) has a positive influence on the development of the phytoplankton and, unlike the previous years when this basin was not protected against flood, results in an adequate primary plankton production. In determining the characteristic of the primary production, the phytoplankton-macrophytes-zooplankton relationship plays a very important role. The value of the primary plakton production is dependent upon the physiological condition of the photosynthesizing organisms and on the trophic group to which these belong.--Copyright 1973, Biological Abstracts, Inc.
W74-01015

SEDGE ASSOCIATIONS FROM THE OZUNCA SWAMP, (IN RUMANIAN),
Brasov Univ. (Rumania).
For primary bibliographic entry see Field 02H.
W74-01016

PLANTATIONS OF CONIFEROUS TREE SPECIES, (IN RUSSIAN),
M. V. Strukov.
Sb Rab Po Lesn Khoz Mold Lesn Opytn Stn. 4 p 146-147. 1970.
Identifiers: *Coniferous treas, Oak, *Pinus-Nigra, Pinus-Nigra-Caramanica, Pinus-Sylvestric, Spruce, *Tree species, *USSR (Moldavia).

Investigations of 37-yr-old plantations in the Gerbovetskii Forest, USSR showed that pine and spruce can grow successfully in the southern steppe zone of Moldavia. The drought resistant Pinus nigra is more suitable to dry conditions, than P. sylvestris and spruce. P. nigra caramanica is similar to P. nigra in its biological characteristics. The productivity of coniferous tree species is 1.5 (site class) higher than that of oak under the same conditions. In establishing pine and oak plantations adequate spacing is important, dense planting may lead to the death of the stands.--Copyright 1973, Biological Abstracts, Inc.
W74-01023

EVALUATION OF A REMOVAL METHOD FOR ESTIMATING THE NUMBERS OF ROCK POOL CORIXIDS (HEMIPTERA, CORIXIDAE),
Helsinki Univ. (Finland). Dept. of Zoology.
For primary bibliographic entry see Field 07B.

W74-01055

THE VARIATION OF WATER RELATIONS AND RESPIRATION INTENSITY IN MALE AND FEMALE EPHEDRA DISTACHYA PLANTS OF THE BLACK SEA COAST AS A FUNCTION OF AGE,
Alexandru Ion Cuza Univ., Iasi (Rumania).
E. Jeanrenaud.
Rev Roum Biol Ser Bot. Vol 17, No 1, p 29-41, 1972. Illus.
Identifiers: Age, *Black Sea, Coasts, *Ephedra-Distachya, *Phenophase, *Respiration, Sea water.

Water relations in male and female E. distachya plants growing in the same biotope (dunes of the littoral) differed in the various phenophases. A direct correlation between the diurnal course of the intensity of respiration and of transpiration was found to exist in the females and males. The value of the intensity of respiration in male and female plants varied with the function that they accomplish in certain phenophases. In experimentally produced progressive dehydration of the tissues, the intensity of respiration varied both as a function of the phenophase and sex.--Copyright 1973, Biological Abstracts, Inc.
W74-01076

THE INFLUENCE OF METEOROLOGICAL ELEMENTS ON THE ANNUAL RHYTHM OF HEIGHT GROWTH IN PINES, (IN GERMAN),
Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Eberswalde (East Germany). Institut fuer Forstwissenschaften.
R. Luetzke.
Flora (Jena). Vol 116, No 4, p 451-462, 1972. Illus. (English Summary).
Identifiers: *Annual, Growth, Height, *Meteorological conditions, Moisture, *Pines, Soils, Solar radiation, Temperature, Winds, Sands.

The measurements were performed in a pole wood on a sandy soil with deep groundwater. The deviations from the average trend of the annual height growth course were caused almost entirely by temperature. When the influence of temperature was eliminated, a relation between increment and global radiation, precipitation, soil-moisture, air humidity, potential evaporation and wind was not to be ascertained. There was a high coefficient of determination for the non-linear regression of time parameter and temperature upon current increment. The reasons for the strong influence of temperature on current height growth and for the lack of influence of the moisture parameters are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01077

ON THE STELLARIO-ALNETUM GLUTINOSAE (MIKYSKA 1944) LOHMEYER 1957 IN THE CZECH SOCIALISTIC REPUBLIC (CSR),
Ceskoslovenska Akademie Ved, Prague. Biologicky Ustav.
Z. Neuhauslova-Novotna.
Folia Geobot Phytotaxon. Vol 7, No 3, p 269-284, 1972. Illus. (English summary).
Identifiers: *Alder, Alnetum-Glutinosae, *Ash, *Czechoslovakia, *Gley, Lamimum-Maculatum, Pulmonaria-obscura, Soils, Stellaria-holostea, Stellaria-nemorum, Water table.

This community is a typical Alnion glutinoso-incanae-forest in brook valleys of the colline and lower submontane situations. Stellario-Alnetum is characterized by the dominance of alder and ash in the tree layer and by the occurrence of the (hygro) mesophilous differential species of the association, Stellaria nemorum, S. holostea, Pulmonaria obscura and Lamimum maculatum in the herb layer. This community represents, from the ecological point of view, a periodically or episodically flooded alluvial forest on gley soils. According to the soil moisture and air regime 4 subassociations can be distinguished: Stellario-Alnetum crepidetosum paludosae with often wet to swampy soils, high groundwater table (typical Gley) and unfavorable air regime of the soils. S.-A. chrysosplenietosum on moisture to wet, but not swampy soils with high groundwater table (typical Gley) and well aerated soils, S.-A. allietosum ursini with fresh soils in the dry period with a high or low groundwater table (typical Gley, Braunerde-Gley) and the well aerated soils and the relatively dry S.-A. typicum with mostly low groundwater table (Braunerde-Gley) and very well aerated soils. The relations of Stellario-Alnetum to the allied Central-European alluvial communities as well as the geographical distribution of this association in Central-Europe are briefly discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01078

DEEPSOIL STUDIES OF OAK ROOT SYSTEMS IN OLD AGE PLANTATIONS, (IN RUSSIAN),
Yu. P. Kravchuk.
Sb Rab Po Lesn Khoz Mold Lesn Opytn Stn. 4, p 129-145, 1970.
Identifiers: *Oak root systems, Old plantations, Roots, *Soils, *USSR (Gervoetskii forest), Soil-water-plant relationships.

Digging out in the Gervoetskii Forest of root systems (RS) of oak 52 and 56 yr old to the full depth of their penetration into the ground (8 m) showed the presence of both surface roots (SR) and deep roots (DR). In the upper soil horizons there is a dense net of large and fine roots while in the deeper layers, there are slightly branching, threadlike, tap and vertical roots. The oak RS envelops a considerable volume of soil (165-200 m3) which improves moisture and nutrient uptake. In tree species with a tap RS, one should distinguish SR zones and DR zones. A major role in forest productivity is played by the upper part of the RS in humus horizons and the role of DR increases in importance during years with low moisture, by raising the resistance of oak to drought. One should not establish pure and excessively dense stands and the optimum structure of stands is: an upper story of oak, with a moderate number of stems, and a second story of shade-tolerant tree species.--Copyright 1973, Biological Abstracts, Inc.
W74-01085

AGE AND GROWTH OF THE CHUB LEUCISCUS CEPHALUS (L.) IN THE OURTHE RIVER AND BERWINE CREEK, (IN FRENCH),
Liege Univ. (Belgium). Aquarium Lab.
J-C. Philippart.
Ann Soc R Zool Belg. Vol 102, No 1/2 p 47-81. 1972, Illus, (English summary).
Identifiers: Age, *Belgium (Ourthe River), *Chub, Growth, Leuciscus-Cephalus, Rivers.

Results are presented of a study of the age and growth of L. cephalus (L.) in the Ourthe river and in the Berwine stream. Preliminary contributions to the study of the biology, the dynamics and the production of the fish community in 2 coarse fish tributaries of the Meuse river, Belgium are also given.--Copyright 1973, Biological Abstracts, Inc.
W74-01097

EFFECT OF DEPTH OF SOIL CULTIVATION AND OF FERTILIZERS ON THE SURVIVAL AND GROWTH OF PINE ON THE LOWER DNIEPER SANDS, (IN RUSSIAN),
For primary bibliographic entry see Field 04A.
W74-01098

2J. Erosion and Sedimentation

ACCUMULATION OF SEDIMENT IN THREE MISSISSIPPI RESERVOIRS,
Mississippi State Univ., State College. Water Resources Research Inst.
C. M. Hoskin.
Available from the National Technical Information Service as PB-224 838, $2.75 in paper copy, $1.45 in microfiche. Completion Report, July 1973. 15 p, 3 fig, 1 tab, 16 ref. OWRR A-061-MISS (1).

Descriptors: *Multiple-purpose reservoirs, *Sedimentation rates, *Mississippi, *Lake sediments, Cores.
Identifiers: *Phleger gravity cores, USM Lake (Miss), Lake Geiger (Miss), Lower Ross Barnett Reservoir (Miss).

Phleger gravity cores were collected from three small reservoirs in Mississippi - USM Lake (7 cores), Lake Geiger (12 cores) and Lower Ross Barnett Reservoir (11 cores). Striking contrasts in color and grainsize permitted differentiation of reservoir sediment (dark green, nearly sand-free) from older and now-inundated soil (red, yellow, brown or grey muddy sand) in these cores. Range and average thickness of reservoir-accumulated sediment for 12-year-old USM Lake, 30-year-old Lake Geiger, and 11-year-old Ross Barnett Reservoir were, respectively, 55 to 342 mm, X 137 mm; 35 to 210 mm, X 93 mm; and 5 to 347 mm, X 58 mm. Average annual rate of sediment accumulation in USM Lake, Lake Geiger, and Lower Ross Barnett Reservoir was calculated to be, respectively, 9 mm/year, 3 mm/year, and 2.6 mm/year. Contrary to expectations, no sedimentary layering was discernible in split cores of these reservoir sediments.
W74-00561

DISTRIBUTION OF TRACE METALS IN THE PORE WATERS OF SHALLOW WATER MARINE SEDIMENTS,
Edinburgh Univ. (Scotland). Grant Inst. of Geology.
For primary bibliographic entry see Field 02K.
W74-00828

CURRENT STATUS OF THE KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS IN CHESAPEAKE BAY,
Maryland Univ., Prince Frederick. Hallowing Point Field Station.
For primary bibliographic entry see Field 02L.
W74-00920

INTERACTION OF NITRILOTRIACETIC ACID WITH SUSPENDED AND BOTTOM MATERIAL.
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
For primary bibliographic entry see Field 05A.
W74-00926

2K. Chemical Processes

THE NATIONAL QUALITY OF GROUND WATER IN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 02F.
W74-00567

PROPAGATION OF SINUSOIDAL SOLUTE DENSITY OSCILLATIONS IN THE MOBILE AND STAGNANT PHASES OF A SOIL,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-00604

RATE AND MECHANISM OF NA-MONTMORILLONITE HYDROLYSIS IN SUSPENSIONS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Isreal). Dept. of Soil and Water.
I. Shainberg.
Soil Science Society of America Proceedings, Vol 37, No 5, p 689-694, September-October 1973. 2 fig, 2 tab, 9 ref.

Descriptors: *Hydrolysis, *Montmorillonite, *Ion exchange, Hydrogen ion concentration, Sodium, Electrical conductance, Conductivity, Water chemistry.

The electrical conductivities of Na-montmorillonite suspensions were studied at various NaCl concentrations and two temperatures as a function of time. The conductivities of the suspensions increased with time, indicating that the suspensions were not stable. The rate of spontaneous decomposition increased with the clay concentration in the suspension and with the temperature. When the electrical conductivities were plotted against the square root of time, a straight line was obtained. These findings suggest that the mechanism of the reaction consists of two elementary consecutive reactions: the first is a rapid exchange reaction between adsorbed Na and H ions in solution and the second reaction is a first-order transformation of H-clay to Al-clay. (Knapp-USGS)
W74-00606

DISSOLVED ALUMINUM IN ACID SULFATE SOILS AND ACID MINE WATERS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soil and Science and Geology.
For primary bibliographic entry see Field 05B.
W74-00607

ANION EXCLUSION AND COUPLING EFFECTS IN NONSTEADY TRANSPORT THROUGH UNSATURATED SOILS: I. THEORY,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Soil Physics.
For primary bibliographic entry see Field 02G.
W74-00611

ALTERNATING CURRENT POLAROGRAPHY IN THE HARMONIC MULTIPLEX MODE. OBSERVATIONS ON THE USE OF DIGITAL SIGNAL CONDITIONING WITH THE FAST FOURIER TRANSFORM ALGORITHM,
Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
For primary bibliographic entry see Field 07C.
W74-00631

POLAROGRAPHIC STUDY OF CALOMEL ELECTRODE IN ANHYDROUS FORMIC ACID,
Quebec Univ., Rimouski (Quebec). Dept. of Pure Sciences.
M. Arnac, and G. Verboom.
Analytical Chemistry, Vol 45, No 11, p 1954-1956, September 1973. 2 fig, 1 tab, 9 ref.

Descriptors: *Electrochemistry, Organic acids, Solubility, Aqueous solutions, Methodology.
Identifiers: *Formic acid, *Polarography, *Saturated calomel electrodes, *Dropping mercury electrode, Organic solvents, Calomel electrodes, Reference electrodes, Amperometric titration.

The formic acid analog of the saturated calomel electrode has been studied by polarography since the equivalent reference is commonly used in glacial acetic acid. Direct current polarograms of the mercury system were obtained for anhydrous formic acid solutions containing variable amounts of chloride. The working cell was equipped with a condenser unit, cooled by circulating ice water. Controlled current oxidation (10 mA) of a mercury coulometric electrode of large area introduced mercurous ions in the solution. The drop time of the capillary electrode was in the range of 4-5 seconds. Voltage scanning was 60 mV per minute. Solutions were all initially deaerated with oxygen-free nitrogen for 10 min. The temperature of the water thermostat used throughout this investigation was maintained at 25.0 plus or minus 0.5 C. Measurements were carried out in a nitrogen atmosphere. Polarographic maximums were eliminated by adding gelatin. The formic acid analog of the saturated calomel electrode fulfills the requirements of a reference system. To calculate the solubility product of calomel it should be necessary to know the complexation constant of mercurous ions with formate ions. This constant has not been determined; the electrochemical system studied proceeds irreversibly in a noncomplexant supporting electrolyte medium (potassium perchlorate). The value of pK and the solubility product constant of mercurous chloride in aqueous solution (ps sub aq equals 17.9) are in the same order of magnitude. Nevertheless calomel precipitation is more quentiative in anhydrous formic acid than in water. (Holoman-Battelle)
W74-00633

SPINNING DROPPING MERCURY ELECTRODE-A PRACTICAL ANALYTICAL TOOL,
Saint John's Univ., Jamaica, N. Y. Dept. of Chemistry.
H. J. Mortko, and R. E. Cover.
Analytical Chemistry, Vol 45, No 11, p 1983-1984, September 1973. 12 ref.

Descriptors: *Monitoring, *Aqueous solutions, *Polarographic analysis, Laboratory equipment, Continuous flow, *Electrodes.
Identifiers: Spinning dropping mercury electrode, Dropping mercury electrode, Limiting currents, Ion selective electrodes.

A spinning dropping mercury electrode (SDME) has been developed for continuous analysis of stirred or flowing systems. The SDME overcomes the difficulty of the vibration dropping mercury electrode (VDME); namely, mechanical complexity and the need for high mercury pressure. The SDME uses straight barometer-tubing capillaries of commercial size which are pointed downward and usable in small diameter streams. The capillary is rotated in a ball-bearing housing aroung its own axis at 0-7000 rpm. The rotating mercury reservoir is attached to the capillary with Tygon tubing. The results obtained with the SDME were similar to those with the VDME, and their polarograms were essentially identical. Optimal analytical response was obtained at the highest agitation rate. Limiting currents for Cd in KNO3, the effect of rotation on maxima and limiting currents, and the effect of drop time on adsorption inhibition are discussed. (Little-Battelle)
W74-00634

AN AMMONIUM ION-SPECIFIC ELECTRODE,
Gulf South Research Inst., New Oreleans, La. Dept. of Analytical Chemistry.
J. G. Montalvo, Jr.
Analytica Chemica Acta, Vol 65, No 1, p 189-197, June 1973. 3 fig, 1 tab, 4 ref.

Descriptors: *Ions, *Aqueous solutions, *Air environment, *Permselective membranes, Fabrication, Selectivity, Pollutant identification, Testing procedures, Hydrogen ion concentration, Chemical reactions, Ureas, Optimization, Sodium chloride, *Sodium, *Potassium.
Identifiers: *Ion selective electrodes, Ammonium, *Ammonium electrodes, Sensors, Ammonium chloride, Potassium chloride, Urease.

The complete lack of response of a gas-permeable membrane cationic electrode to potassium and sodium ion (at representative clinical levels) and the response to ammonium ion are illustrated by noting the response when the electrode is dipped into various solutions. An ammonium ion-specific electrode was prepared by coupling a hydrophobic ammonia-permeable membrane to a Beckman monovalent cation electrode. At physiological pH values the ratio of ammonia to ammonium ion is only 0.01, yet the gas-transport mechanism is still operable; an electrode designed on this principle was able to detect ammonium ion produced via the urea-urease reaction. The electrode can be operated in an air stream or in an aqueous medium. The electrode can also be used in an ultra-sensitive mode by pH stripping of ammonia from the test solution. (Holoman-Battelle)
W74-00636

ELECTROCHEMICAL STUDY OF A HETEROGENEOUS COPPER (II)-SELECTIVE ELECTRODE; STUDY OF SELECTIVITY AND POTENTIAL STABILITY,
Technical Univ. of Budapest (Hungary). Inst. for General and Analytical Chemistry.
J. Pick, K. Toth, and E. Pungor.
Analytica Chimica Acta, Vol 65, No 1, p 240-244, June 1973. 6 fig, 4 ref.

Descriptors: *Selectivity, *Copper, Aqueous solutions, *Heavy metals, Water analysis, Stability, *Ions.
Identifiers: *Ion selective electrodes, *Membrane electrodes, Life time, *Potential stability, Chemical interference, Pretreatment, Electrode potential.

The lifetime of the copper (II)-selective membrane electrode was studied for three conditions: (1) in the first period of pretreatment in a reducing medium; (2) in prolonged use; and (3) on soaking the electrode in 1 M copper (II) sulfate. The results showed that the electrode responds to Cu (II) without pretreatment, but pretreating in reducing medium such as ascorbic acid is necessary to obtain reproducible results. Electrode response decayed only after 3 months. Soaking in copper sulfate reduced lifetime to 3 weeks, but the effect was reversible by treatment in a reducing medium. Selectivity tests were conducted with solutions containing Pb, Cd, Zn, Co, Ni, Mn, Ag, Hg, and Bi ions. The first six ions did not adversely affect electrode response; however, metal cations such as Ag, Hg, and Bi which form less soluble sulfide precipitates than copper sulfide interfered with the electrode function. (Little-Battelle)
W74-00637

POLYMER MEMBRANE ELECTRODES. PART I. A CHOLINE ESTER-SELECTIVE ELECTRODE,
Corning Glass Works, N. Y. Research and Development Lab,.
G. Baum, M. Lynn, and F. B. Ward.
Analytica Chemica Acta, Vol 65, No 2, p 385-391, July 1973. 2 fig, 4 tab, 9 ref.

Descriptors: Fabrication, *Permselective membranes, Hydrolysis, Biochemistry, Chemical reactions, Electrochemistry, Selectivity, Cations, *Electrodes.
Identifiers: *Ion selective electrodes, *Polymer membrane electrodes, Choline ester electrodes, *Enzyme activity, Performance evaluation, Sensors, Acetycholinesterase, Acetycholine, Polyvinyl chloride membranes, Liquid membrane electrodes, Choline, Acetyl-beta-methylcholine, Butyrylcholine.

An electroactive polyvinylchloride membrane can be prepared which has a Nernstain response towards choline and choline esters. The membrane is prepared from a solution of acetylcholine tetra-p-chlorophenylborate in a phthalate ester which serves as the plasticizer for PVC. The membrane electrode can be used for the kinetic assay of acetylcholine esterase activity. A rate equation is derived which describes the response of the electrode towards simultaneous substrate disappearance and product formation during the en-

zyme-catalyzed hydrolysis of acetylcholine. The performance of the polymer membrane electrode is markedly superior to the liquid-membrane electrode. The polymer membrane electrode has a very short recovery time between assays (1-3 min) and the start-up after an overnight storage is only about 10 min. The results obtained with the polymer membrane electrode exhibit significantly less scatter than the results obtained with the liquid-membrane electrodes. (See also W74-00648) (Holoman-Battelle)
W74-00647

POLYMER MEMBRANE ELECTRODES. PART II. A POTASSIUM ION-SELECTIVE MEMBRANE ELECTRODE,
Corning Glass Works, N. Y. Research and Development Lab.
G. Baum, and M. Lynn.
Analytica Chimica Acta, Vol 65, No 2, p 393-403, July 1973. 7 fig, 3 tab, 16 ref.

Descriptors: Semipermeable membranes, *Permeability, Fabrication, Selectivity, Permselective membranes, Chemical properties, Physical properties, Electrochemistry, Electrolytes, Electrodes.
Identifiers: *Polymer membrane electrodes, *Potassium electrodes, *Plasticizers, Chemical composition, Phthalate esters, Membrane electrodes, Ion selective electrodes, Dibutylphthalate, Liquid membrane electrodes, Dioctylphthalate, Di-i-nonylphthalate, Diethoxyethylphthalate, Tri (2-ethylhexyl) phosphate, Tricresylphosphate, Phenyldioctylphosphonate, m-Nitrodiphenyl ether, 3-o-Nitroxylene, p-Hexylnitrobenzene, p-Nitrophenyloctyl ether, o-Nitrophenylbutyl ether.

An ion-selective plasticized polymer membrane electrode of the ion-exchange type is described for potassium. The chemical nature of the plasticizer has a dominant influence on the slectivity of the electrode towards univalant cations. The selectivity ratio was examined over an extended time interval as a function of membrane thickness and plasticizer content. A simplified procedure for the determination of the selectivity ratio of the electrode in mixed electrolyte solutions is proposed and compared with several of the methods which have been described in the literature. (See also W74-00647) (Holoman-Battelle)
W74-00648

A STUDY OF LIQUID-MEMBRANE PERCHLORATE-SELECTIVE ELECTRODES MADE FROM AN ORGANIC RADICAL ION SALT,
Umea Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 05A.
W74-00649

ANION SELECTIVITY STUDIES ON LIQUID MEMBRANE ELECTRODES,
Florida Atlantic Univ., Boca Raton. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-00650

CLINICAL LABORATORY EXPERIENCE WITH THE IMPROVED ENTEROTUBE,
Long Island Jewish-Hillside Medical Center, New Hyde Park, N.Y.
For primary bibliographic entry see Field 05A.
W74-00655

GROUNDWATER SURVEY OF THE ERBIL PROJECT AREA,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 04B.
W74-00761

DIRECT MEASUREMENT OF POTASSIUM PERMANGANATE DEMAND AND RESIDUAL POTASSIUM PERMANGANATE,
New York State Dept. of Environmental Conservation, Delmar. Wildlife Research Lab.
For primary bibliographic entry see Field 05A.
W74-00765

ISOTOPE EFFECT AND THE MOLECULAR MECHANISM OF THE SECOND VISCOSITY COEFFICIENT OF WATER,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 01A.
W74-00770

BIBLIOGRAPHY OF REPORTS ON THE WATER RESOURCES OF INDIANA PREPARED BY THE U.S. GEOLOGICAL SURVEY, 1886--1972,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 02E.
W74-00814

ADSORPTIVE EXTRACTION FOR ANALYSIS OF COPPER IN SEAWATER,
Woods Hole Oceanographic Institution, Mass.
W. B. Kerfoot, and R. F. Vaccaro.
Limnology and Oceanography, Vol 18, No 4, p 689-693, July 1973. 4 fig, 13 ref. NSF Grant GB-33479 and GI-32140.

Descriptors: *Activated carbon, *Copper, *Water analysis, Trace elements, Water chemistry, Chemical analysis, Adsorption.

Activated carbon can remove trace amounts of complexed and ionic copper from water. Just 10 mg of finely divided carbon is sufficient to concentrate copper from seawater to 700 times its natural level. When the copper is eluted with acid and analyzed by atomic absorption, the results compare well with organic extraction methods now in use, although the accuracy is somewhat reduced. (Knapp-USGS)
W74-00827

DISTRIBUTION OF TRACE METALS IN THE PORE WATERS OF SHALLOW WATER MARINE SEDIMENTS,
Edinburgh Univ. (Scotland). Grant Inst. of Geology.
P. Duchart, S. E. Calvert, and N. B. Price.
Limnology and Oceanography, Vol 18, No 4, p 605-610, July 1973. 1 fig, 2 tab, 23 ref.

Descriptors: *Trace elements, *Pore water, *Bottom sediments, *Sea water, Manganese, Iron, Copper, Nickel, Zinc, Cobalt, Lead.
Identifiers: *Scotland (Lock Fyne).

The concentrations of seven trace metals in the pore waters of marine sediments from Loch Fyne, Scotland, were analyzed by atomic absorption spectrophotometry following solvent extraction. The samples were taken from sediments containing variable amounts of sulfide at depth and variable thicknesses of oxides at the surfaces; one core contains abundant manganese nodules and manganese-calcium carbonate concretions. The distribution of dissolved Mn shows a regular downward decrease in all cores; this is interpreted as an indication of recycling of Mn between solid diagenetic mineral phases and pore solutions. Dissolved Fe, in much lower concentrations, either decreases or increases down the core depending on the type of sediment; Cu, Ni, Zn, Co, and Pb also show variable concentration profiles indicating control by different postdepositional reactions in the sediment, which in turn depend on different physiochemical environments generated by variable amounts of contained organic material and different accumulation rates. (Knapp-USGS)
W74-00828

SEASONAL VARIATIONS OF CADMIUM, COPPER, MANGANESE, LEAD, AND ZINC IN WATER AND PHYTOPLANKTON IN MONTEREY BAY, CALIFORNIA,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
G. A. Knauer, and J. H. Martin.
Limnology and Oceanography, Vol 18, No 4, p 597-604, July 1973. 3 fig, 3 tab, 20 ref.

Descriptors: *Water chemistry, *Cadmium, *Copper, *Manganese, Seasonal, Lead, Zinc, Plankton, *California, Sampling.
Identifiers: *Monterey Bay (Calif).

Surface water and mixed phytoplankton samples, collected over 1 year in Monterey Bay, California, were analyzed for Cd, Cu, Mn, Pb, and Zn. The phytoplankton appeared to have little effect on the concentrations of these elements in water with the exception of Cd, which decreased during peak periods of productivity. Generally, metal levels in nearshore surface waters appeared to be more dependent on hydrographical fluctuations than on biological factors. Surface water collected on a transect between Hawaii and Monterey was analyzed for these same trace metals, for inshore-offshore comparisons. Levels of Cu, Mn, and Zn were usually higher inshore than offshore esecially during periods of strong upwelling. Concentrations of Cd and Pb were almost always an order of magnitude higher inshore. (Knapp-USGS)
W74-00829

CHANGES IN THE CONCENTRATION OF SOLUBLE AND PARTICULATE IRON IN SEA-WATER ENCLOSED IN CONTAINERS,
Washington Univ., Seattle. Dept. of Oceanography.
J. Lewin, and C. Chen.
Limnology and Oceanography, Vol 18, No 4, p 590-596, July 1973. 4 fig, 3 tab, 10 ref. NSF Grant GA-27498.

Descriptors: *Water chemistry, *Sea water, *Iron, *Chelation, Chemical reactions, Chemical precipitation, *Washington.
Identifiers: *Puget Sound (Wash).

Seawater samples collected along the Washington coast (Puget Sound) were used as sources of naturally occurring iron fractions. Once the water was enclosed in a container, approximately half of the iron in the soluble fraction disappeared and could be quantitatively accounted for by an increase in the iron of the particulate fraction; when the particulate fraction was removed at zero time, soluble iron likewise disappeared, but most of it went onto the walls of the container. The changes were independent of temperature and soluble iron disappeared even when the particulate fraction (including organisms) was removed at zero time, ruling out biological activity. These changes were completed in 30-40 hr. Part of the soluble fraction was ferrous iron. Addition of Na2-EDTA stabilized a portion of the soluble iron equivalent to the ferrous content and kept it from disappearing during the experiment. Ferrous iron may be present in a chelated form in the natural seawater. (Knapp-USGS)
W74-00830

CURRENT PRACTICE IN GC-MS ANALYSIS OF ORGANICS IN WATER,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05A.
W74-00834

HYDROCHEMICAL ZONALITY OF URAL LAKES (GIDROKHIMICHESKAYA ZONAL'-NOST' OZER URALA),
For primary bibliographic entry see Field 02H.
W74-00840

ORGANIC MATTER COMPOSITION UNDER DIFFERENT FOREST TYPES IN A DERNO-PODZOLIC ZONE, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Pedology.
T. K. Bykovskaya.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 4, p 116-117. 1972. (English summary).
Identifiers: *Derno-Podzolic zone, *Forest types, Fulvic acids, Litter, *Organic matter, Soil profile, Soils, Tree species, *USSR.

The organic matter composition of litter and the upper horizons in some forest soils of Zvenigorodka Biological Station, USSR was studied. Although fulvic acids predominate in the humus, considerable differences were found between individual soil profiles as affected by the tree species and litter composition.--Copyright 1973, Biological Abstracts, Inc.
W74-00984

CONCERNING A NEW GRAPHIC METHOD FOR STUDY OF NATURAL WATERS (IN FRENCH),
Institut National des Sciences Appliquees, Toulouse (France).
H. Roques.
Ann Speleol, Vol 27, No 1, p 79-92, 1972, Illus, English summary.
Identifiers: *Aragonite, *Calcite, Calcium, Carbon dioxide, *Carbonates, *Graphic methods.

A new graphic method for natural water study is being suggested. The proposed graph enables the equilibrium conditions to be determined with respect to calcite and aragonite in terms of the temperature, the ionic force and the concentration in foreign salts at the CO2-H2O-CaCO3 system. A correction which takes into account the Mg complexes is introduced. The content in dissolved CO2 and the partial pressure of CO2 in the gaseous phase are also available on this graph.--Copyright 1973, Biological Abstracts, Inc.
W74-01008

COMPLEMENTARY ROLE OF IRON (III), SULFATE AND CALCIUM IN PRECIPITATION OF PHOSPHATE FROM SOLUTION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
For primary bibliographic entry see Field 05D.
W74-01053

SELECTED WATER-QUALITY RECORDS FOR TEXAS SURFACE WATERS, 1971 WATER YEAR,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01086

WATER QUALITY ASSESSMENT PRACTICE IN AUSTRALIA,
Melbourne Water Science Inst. (Australia).
B. J. Lyons, and C. D. Parker.
Australian Water Resources Council Technical Paper No. 4, 1973. 60 p, 18 tab, 93 ref.

Descriptors: *Water analysis, *Chemical analysis, *Water quality, *Analytical techniques, *Australia, Appraisals, Evaluation, Programs, Projects, Surface waters, Groundwater, Laboratory tests, Research and development, Sampling, Monitoring, Networks, Census, Statistics, Documentation.

Details are presented of the findings of a research project, Detection, Identification and Measurement of Water Quality Characteristics, which was supported by the Water Research Fund of the Australian Water Resources Council. The primary aim of the project was to provide a comprehensive review of current Australian practice for use in the work of the Council's Technical Committee on Water Quality and to identify research needs. The project findings will be of value to a wide range of operational and research bodies concerned with the assessment and management of water resources. The findings are presented in tables and discussed in the text. Documentation of monitoring programs, laboratory procedures for physical, chemical, and biological characteristics is presented. The survey has shown that there exists an extensive field of expertise in this field in Australian laboratories. Apart from the areas indicated, practice in Australian laboratories is based on full appreciation of overseas knowledge. Consideration was also given to research and development both in Australia and overseas on sampling and monitoring procedures and methods used to identify and measure characteristics. (Woodard-USGS)
W74-01089

QUANTITY AND CHEMICAL QUALITY OF LOW FLOW IN THE UPPER COLORADO RIVER BASIN, TEXAS, APRIL 8, 1968,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02E.
W74-01090

2L. Estuaries

STUDIES ON BRACKISH WATER PHYTOPLANKTON,
North Carolina Univ., Chapel Hill. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00589

THE PHYTOPLANKTON OF GALES CREEK WITH EMPHASIS ON THE TAXONOMY AND ECOLOGY OF ESTUARINE PHYTOFLAGELLATES--PART 1 OF STUDIES ON BRACKISH WATER PHYTOPLANKTON,
North Carolina Univ., Chapel Hill. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00590

PHYTOPLANKTON POPULATIONS IN BRACKISH WATER PONDS, A REVISED REPORT--PART II OF STUDIES ON BRACKISH WATER PHYTOPLANKTON,
North Carolina Univ., Chapel Hill. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00591

RESPONSE OF AQUATIC LIFE TO SALINITY, TEMPERATURE, DISSOLVED OXYGEN, AND WATER FLOW,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 05C.
W74-00721

POLLUTION EFFECTS ON LITTORAL ALGAL COMMUNITIES IN THE INNER OSLOFJORD, WITH SPECIAL REFERENCE TO ASCOPHYLLUM NODOSUM,
Norway Inst. of Water Resources, Oslo.
For primary bibliographic entry see Field 05C.
W74-00733

HYDROCARBON INCORPORATION INTO THE SALT MARSH ECOSYSTEM FROM THE WEST FALMOUTH OIL SPILL,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05.
W74-00824

ESTUARIES, BAYS AND COASTAL CURRENTS AROUND PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
For primary bibliographic entry see Field 07C.
W74-00832

THE TIDAL POWER POTENTIAL OF UNGAVA BAY AND ITS POSSIBLE EXPLOITATION IN CONJUNCTION WITH THE LOCAL HYDROELECTRIC RESOURCES,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 04A.
W74-00838

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX A--THE PEOPLE AND THE ECONOMY.
Corps of Engineers, Baltimore, Md.

1973. 230 P.

Descriptors: *Chesapeake Bay, *Water resources development, *Human population, *Economics, Reviews, Projections, Evaluation, Industries, Agriculture, Urbanization, Construction, Mining, Public utilities.

Appendix A of the Chesapeake Bay Existing Conditions Report contains 6 chapters: (1) Introduction, (2) Economic History, (3) Population Characteristics, (4) Economic Sectors, (5) Economic and Demographic Projections, and (6) Summary. The economic history of the Chesapeake Bay Region contains elements which point toward the future. Height, width, and breadth are combined with time and change to achieve meaning. The chapter on population characteristics is limited to historic and recent demographic trends, and the age and educational levels of the population. The second half of this chapter lists current employment and income figures in the Bay Region. The chapter concerned with economic sectors includes an analysis of the manufacturing, public administration, agriculture, construction, mining, wholesale and retail trade, armed forces, transportation, communications, utilities, services, finance, insurance, and real estate industries. All these sectors are disaggregated, where appropriate, into various components. The chapter on economic and demographic projections includes a program of economic measurement conducted by the Bureau of Economic Analysis and the Economic Research Service. Projection methodology is the main thrust of this section. (See also W74-00888 thru W74-00891 and W74-00924) (Woodard-USGS)
W74-00887

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME I.
Corps of Engineers, Baltimore, Md.

1973, 215 P.

Descriptors: *Chesapeake Bay, *Water resources development, *Land resources, *Land use, Geology, Mineralogy, Soil types, Climatology, Hydrology, Surface waters, Groundwater resources, Aquifer characteristics, Sedimentation, Reviews.

Appendix B, Volume I, of the Chesapeake Bay Existing Conditions Report contains 9 chapters: (1) Introduction, (2) Geology of the Bay Region, (3) Mineral Resources of the Bay Region, (4) Soils of the Basin, (5) Land Use, (6) Climate, (7) Surface Water-Hydrology, (8) Ground Water Resources, and (9) Sedimentation. In developing an effective water-land management program, existing land resources must be carefully defined and understood. Consequently, all of the component elements of Appendix B are, in some way land-oriented. Such things as water quality and supply,

groundwater occurrence, runoff, and infiltration, among others, are affected by the nature of specific geologic elements. Geology has a major influence on the occurrence of mineral resources. Both the Piedmont and Coastal Plain Provinces within the Chesapeake Bay Region contain rich resources of economic importance. These mineral resources and their principal areas of location are analyzed. Soil cover is described as it directly affects such physical conditions as streamflow patterns, erosion, and amount and type of flood protection needed. The study area is broken down into major types of land use in order to analyze the present distribution of each. Data are presented on precipitation, temperature, winds, and evaporation as they influence the use made of both the Bay's land and water resources. The drainage basins and the flows of the major tributary rivers to the Bay include the extremes of flow, both floods and droughts, as well as monthly and yearly averages. Ground water and aquifer systems data show areal distribution, yield, and quality characteristics. Federal State, and local sedimentation controls are reviewed to determine their effectiveness, and to point out the need for continued efforts in this area. (See also W74-00887, W74-00889 thru W74-00891 and W74-00924) (Woodard-USGS)
W74-00888

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME II.
Corps of Engineers, Baltimore, Md.

310 P, 1973.

Descriptors: *Chesapeake Bay, *Water resources development, *Land resources, *Land use, Water supply, Water quality, Recreation facilities, Electric powerplants, Reviews, Projections, Evaluation.

Appendix B, Volume 2, of the Chesapeake Bay Existing Conditions Report contains 5 chapters entitled Water Supply, Water Quality, Recreation, Power, and Summary. Data on the present water supply facilities in the Chesapeake Bay Region should prove valuable in projecting future water supply needs and planning for the future use of the Bay's water resources. Existing water quality conditions in the Bay and its tidal tributaries are delineated. The beneficial water uses are considered with water quality standards established for the support of these uses. Water problems and inventories of industrial and municipal waste water discharges are presented. The present use and design capacities of recreational facilities on a subregional basis are provided. In addition, the type, location, and capacity of four recreation activities which include swimming, boating, camping, and picniking are tabulated. Electric power plants on the Bay and its tidal tributaries which are currently in operation or near completion are inventoried. A discussion of the social, economic, biological, chemical, and physical conditions which should be considered in the selection of plant sites also is included, along with an analysis of the effects of thermal additions on the water and land resources. (See also W74-00887, W74-00888, W74-00890, W74-00891 and W74-00924) (Woodard-USGS)
W74-00889

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME I.
Corps of Engineers, Baltimore, Md.

1973, 331 P.

Descriptors: *Chesapeake Bay, *Water resources development, *Environmental effects, Beach erosion, Floods, Hurricanes, Navigation, Eutrophication, Aquatic plants, Dredging, Fish, Wildlife, Ecology, Erosion control.

Appendix C, Volume 1, of the Chesapeake Bay Existing Conditions Report contains 6 chapters: (1) Introduction, (2) Shoreline Erosion, (3) Hurricane Flooding, (4) Navigation, (5) Noxious Weeds, and (6) Fish and Wildlife Resources. All of the components of this appendix are, in some way, oriented toward the Bay and its resources. Delineation of areas where significant beach erosion has occurred as well as the rates of erosion are provided. Also discussed are the existing Federal and non-Federal erosion control projects along with the types of action which have been used to retard beach erosion. Important floods of the past, existing flood control measures, and present and potential flooding problems are described. The Bay's foreign and domestic commerce is itemized and quantified, and all Federal and State programs and projects which are supportive of the extensive waterborne traffic are outlined. The types and extent of noxious weeds, problems resulting from plants, current methods of control, and Federal and State control programs are examined as they affect navigation, flood control, agriculture, recreation, fish and wildlife preservation, and property value. (See also W74-00887 thru W74-00889, W74-00891 and W74-00924) (Woodard-USGS)
W74-00890

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME II.
Corps of Engineers, Baltimore, Md.

1973. 387 P.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Classification, Environmental effects, Biological communities, Estuaries, Biology, Aquatic life, Ecosystems, Ecotypes, Sediments, Sedimentation, Salinity, Eutrophication, Benthos, Dominant organisms, Bioassay, Water quality, Pesticides, Water pollution sources, Water pollution effects.
Identifiers: *Biota taxonomy.

Appendix C, Volume 2, of the Chesapeake Bay Existing Conditions Report contains 2 chapters: Biota of Chesapeake Bay, and Summary. The existing condition of the biota of the Chesapeake Bay was prepared by the Chesapeake Research Consortium. The Consortium is composed of the Virginia Institute of Marine Science, the University of Maryland, the Johns Hopkins University, and the Smithsonian Institution. Research includes an analysis of biological criteria for environmental change plus two inventories. One is an inventory of biological organisms occurring within the Bay, the other includes research projects, institutions, and scientists involved in biota studies. The intent is to provide data on the existing processes and resources on the Bay so that ultimately a waterland management program can be established. (See also W74-00887 thru W74-00890 and W74-00892 thru W74-00924) (Woodard-USGS)
W74-00891

BACTERIA, YEASTS, VIRUSES AND RELATED MICROORGANISMS OF THE CHESAPEAKE BAY,
Georgetown Univ., Washington, D.C. Dept. of Biology.
R. R. Colwell.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-30--C-33, 1973. 15 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Bacteria, *Classification, Water pollution effects, Microorganisms, Sewage effluents, Water pollution sources, Yeasts, Viruses, Water quality, Water analysis, Coliforms, Reviews, Bibliographies.
Identifiers: *Protists taxonomy.

The taxonomy of the yeasts, bacteria, viruses, and other protists, viz., Rickettsia, Chamydia, and Mycoplasma, is presently under review. Because the taxonomy of the protists is presently in a state of flux, it is best to present taxonomic data as lists of genera within the major orders: Eubacteriales; Pseudomonadales; Hyphomicrobiales; Mycoplasmatales; Rickettsiales; Chlamydobacteriales; Caryophanales; Spirochaetales; Myxobacterales; and Actinomycetales. Because so little is known about the distribution of protists, other than the bacteria, in Chesapeake Bay, the taxonomical knowledge of groups other than the bacteria cannot be discussed profitably. Bacteria are widely distributed in Chesapeake Bay water and sediment and are found in association with the aquatic flora and fauna of the Bay. Total viable aerobic heterotrophic bacterial populations range from 100-1,000 per ml in water and 10,000-100,000 per gm in sediments. The species distribution of bacteria is related to the available substrate (s). Mercury-tolerant bacteria are found in the industrial spoil dumping areas, and variations in the bacterial flora have been found to occur with respect to geographical location within the Chesapeake Bay. Clearly, pollution of the Bay with new or incomplete sewage treatment raises the total bacterial load and introduces coliform bacteria. (See also W74-00891) (Woodard-USGS)
W74-00893

FUNGI OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
C. A. Shearer.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-34--C-36, 1973. 18 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic fungi, *Classification, Estuaries, Environmental effects, Soils, Ecosystems, Ecology, Salinity, Water temperature, Biology, Water pollution effects, Reviews, Bibliographies.
Identifiers: *Fungi taxonomy.

Representatives of all major groups of fungi are known to occur in estuaries, and although a large number of species of fungi have been reported from estuaries, there have been few taxonomic studies of fungi in the Chesapeake Bay. Aquatic Phycomycetes in soils bordering the Patuxent River and the wood-inhabiting Ascomycetes and Fungi Imperfecti of the Patuxent River have been studied. The distribution of wood-inhabiting Ascomycetes and Fungi Imperfecti in the Patuxent River is affected by changes in salinity while the distribution of aquatic Phycomycetes in soils surrounding the upper Patuxent estuary is not affected by changes in salinity. Comprehensive and regular sampling for fungi is necessary before any generalizations about the distribution and abundance of fungi in the Bay can be made. Little is known about the sensitivity of estuarine fungi to man-induced environmental changes. In the Patuxent River, the addition of heated water during the summer months caused a decrease in the number of species and a replacement of the dominant species by another species common only at warm temperatures. (See also W74-00891) (Woodard-USGS)
W74-00894

NANNOPLANKTON OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany; and Maryland Univ., Solomons. Natural Resources Inst.
S. D. Van Valkenburg.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-37--C-39, 1973. 4 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Nannoplankton, *Classifi-

cation, Estuaries, Water pollution sources, Pollutant identification, Aquatic life, Phytoplankton, Microorganisms, Reviews.
Identifiers: *Nannoplankton taxonomy.

The large majority of extant phytoplankton organisms is poorly known taxonomically, principally because only a relatively small number of species has been cultured. A number of diatoms and dinoflagellates and blue-green algae have been listed for Chesapeake Bay. However, very few nannoplankton or microplankton (herein designated as flagellated or coccoid photosynthetic, planktonic organisms of under 10 micro meters in diameter) have been reported for Chesapeake Bay. These omitted groups cover a large taxonomic area, including the Chrysophyceae, Haptophyceae, Xanthophyceae (or Xanthophyta), many of the Chlorophyceae, and all of the Crytophyta. Studies of primary production using C-14 and chlorophyll measurements have been made in Chesapeake Bay. Work is in progress to measure size fractionization of phytoplankton at specific locations in the Bay with reference to C-14 uptake, chlorophyll a, and species composition. Preliminary data indicate the contribution of the smaller organisms may approximate 50 percent of total production in the late winter months. Although the number of species of nannoplankton that have been adequately studied is relatively small, it is probable that these forms may have utility as indicator species for pollutional levels in the Chesapeake Bay. (See also W74-00891) (Woodard-USGS)
W74-00895

PHYTOPLANKTON OF THE CHESAPEAKE BAY,
Academy of Natural Sciences of Philadelphia, Benedict, Md. Benedict Estuarine Lab.
R. A. Mulford.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-40--C-56, 1973. 22 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Phytoplankton, *Classification, Estuaries, Nannoplankton, Aquatic life, Microorganisms, Environmental effects, Water temperature, Salinity, Diatoms, Biology, Ecosystems, Ecology, Reviews, Bibliographies.
Identifiers: *Phytoplankton taxonomy.

Organisms included in this Chesapeake Bay phytoplankton summary belong to four plant divisions and 10 classes. They are primarily the diatoms, dinoflagellates, silicoflagellates, planktonic green and blue-green algae and the micro flagellates, often referred to as the ultraplankton or nannoplankton. Thirty-six species have been selected from an initial listing of 613. Six percent of the total Bay phytoplankton species probably account for the majority of planktonic biomass exclusive of ultraplankton. Generally, diatoms are most abundant in the fall, winter, and spring period when water temperatures are below 20 deg C. However, temperature does not necessarily seem to be an important indicator of population density. Other parameters such as nutrients, day length, and turbidity are probably more significant. Planktonic diatom populations in the lower Bay are generally more diverse with a mixing of estuarine and marine or oceanic species. With the reduced salinity gradient near mid-Bay, many of the lower Bay forms disappear from the community and their place is taken by other species of green algae. Consequently, the Bay populations from the mouth to head mimic the river communities with their subsequent salinity gradients. (See also W74-00891) (Woodard-USGS)
W74-00896

BENTHIC MACROALGAE OF THE MARYLAND PORTION OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
R. W. Krauss, and P. Orris.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-57--C-59, 1973. 2 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Benthos, *Aquatic algae, Estuaries, Classification, Environmental effects, Ecosystems, Ecology, Water pollution effects, Phosphates, Nutrients, Water temperature, Heavy metals, Reviews.
Identifiers: *Benthic Macroalgae taxonomy.

Records of benthic macroalgae (Xanthophyta, Chlorophyta, Phaeophyta, Rhodophyta) found in upper Chesapeake Bay are primarily from specimens housed in the University of Maryland Algal Herbarium (Department of Botany). A preliminary checklist was prepared from this collection, and further verification of these specimens is presently underway. No data is published on the distribution and abundance of macroalgae in the upper Bay. A better understanding of the largely unknown basic biology of benthic macroalgae would greatly aid in predicting the effect of man-induced environmental changes. Specifically, one needs to understand the metabolism of nutrients, such as phosphorus and nitrogen, in algae in order to predict the effect of phosphorus- and nitrogen-rich waste additions. The effect of temperature on photosynthesis, respiration, and growth rates, as well as life cycles and reproduction, must be understood to predict the effect of thermal additions or changes by man. The concentration of heavy metals at the base of the food web, the destruction of certain algae, or the enhancement of others to nuisance proportions has the potential of being detrimental to the entire biota of an area. (See also W74-00891) (Woodard-USGS)
W74-00897

MACROALGAE OF THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point.
F. D. Ott.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-60--C-62, 1973.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic algae, *Estuaries, Ecosystems, Ecology, Classification, Water pollution sources, Water pollution effects, Environmental effects, Sewage effluents, Industrial wastes, Reviews.
Identifiers: *Macroalgae taxonomy.

There are approximately 213 taxa known for macroalgae flora along the Atlantic coasts of Maryland and Virginia including the Chesapeake Bay area. These are distributed into four algal divisions: Chlorophyta, taxa 55, percent 25.8; Phaeophyta, taxa 29, percent 13.6; Rhodophyta, taxa 54, percent 25.4; and Cyanophyta, taxa 75, percent 35.2. Much work remains to be done. The initial statement does not imply that all taxa for the area have been determined. Little information is available concerning the macroalgal flora of the salt marshes and of the deeper waters of the Chesapeake Bay and off the Virginia and Maryland coasts. The greatest population densities among the macroalgae are found on manmade structures (jetties, etc.). At dilute levels, sewage may cause luxuriant development of algae with the Ulvales, i.e., Ulva, Enteromorpha, being the last group of macroalgae to be adversely affected as the level of pollution increases. At very high levels of sewage pollution only blue-green algae are found. The effect on macroalgae of toxic inorganic and organic substances which may be released into the water by various industries is unknown. (See also W74-00891) (Woodard-USGS)
W74-00898

BRYOPHYTES AND LICHENS OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
A. B. Owens.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-63--C-64, 1973. 8 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Lichens, *Estuaries, Ecosystems, Ecology, Classification, Environmental effects, Water pollution sources, Water pollution effects, Air pollution, Air pollution effects, Reviews, Bibliographies.
Identifiers: *Bryophytes, *Lichens taxonomy.

An extensive survey of the bryophytes which occur throughout the States of Maryland and Virginia has been made, although many areas need to be studied intensely. One such area is the Chesapeake Bay at its high tide line. A taxonomic survey of the lichens has not been made. There are no known aquatic lichens in this latitude. However, lichens do contribute to the biomass in the wetlands. There are no known bryophytes in salt or brackish water. However, some occur at the base of the Bay banks where they are in contact with lapping waves during extreme high tides. Several species are of frequent occurrence along the margins of the tributaries in the upper region of the Chesapeake Bay and its tributaries. Little data are available on the distribution of these plants in the lower region of the Bay. One lichen species, Caloplaca citrina (Hoffm.) Th.Fr., occurs abundantly on concrete within the spray zone along the Bay. The possible effects on the bryophytes of man-induced changes are not known. It is likely that changes in temperature would be detrimental to those few bryophytes which are truly aquatic. Lichens are natural indicators of air pollutants. Industrial and auto waste materials in the air are absorbed and accumulated within the lichen thallus. When a toxic level is reached the lichen dies. (See also W74-00891) (Woodard-USGS)
W74-00899

VIRUSES OF AQUATIC PLANTS OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
M. K. Corbett.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-65--C-67, 1973. 12 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Viruses, *Biota, *Aquatic plants, Plant viruses, Classification, Estuaries, Ecosystems, Ecology, Water pollution sources, Water pollution effects, Biology, Aquatic microorganisms, Reviews, Bibliographies.
Identifiers: *Viruses taxonomy.

Little is known about the distribution of viruses of aquatic plants in the Chesapeake Bay. However, most plants, especially those of agronomic and horticultural importance, have been reported to suffer the adverse effects of viruses. Viral-like particles have been reported from a variety of cryptogamic hosts including the aquatic Phycomycete Aphelidium sp.; Agaricus bisporus; Peziza ostracoderma; Penicillium spp.; the green alga Chlorella pyrenoidosa; the freshwater red alga Serodotia tenuissima; the green alga Oedogonium sp.; and the marine brown alga Chorda tomentosa. Viruses have also been studied in the procaryotic blue-green algae and bacteria. A disease of Eurasian milfoil (Myriophyllum spicatum) was studied in the Chesapeake Bay by Bayley, et al, and was reported to be viral in nature. (See also W74-00891) (Woodard-USGS)
W74-00900

SUBMERGED VASCULAR PLANTS OF THE CHESAPEAKE BAY AND TRIBUTARIES,
American Univ., Washington, D.C. Dept. of Biology.
R. R. Anderson.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-68--C-71, 1973. 13 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Submerged plants, *Vascular tissues, Classification, Estuaries, Aquatic populations, Ecosystems, Ecology, Fish, Wildlife, Water pollution effects, Water pollution sources, Nutrients, Salinity, Reviews, Bibliographies.
Identifiers: *Submerged vascular plant taxonomy.

Submerged vascular plants are widely distributed in the Chesapeake Bay and tributaries wherever shallow, quiet, and relatively clean waters are present. Little is known of population fluxes, interspecies relationships, or rates at which new areas may be colonized. Extensive rhizone systems shallowly buried in the bottom muds provide the bulk of reproductive potential. Water salinity and bottom type appear to be the major environmental factors controlling species distribution. The general roles that submerged plants play in aquatic ecosystems is well known. These include bottom stabilization, water oxygenation, shelter and food for young fish, and flood for wildfowl. There is some documentation on wildfowl use of aquatic vegetation in the Bay. R. maritima, V. americana, C. demersum, Z. marina are considered to be very important food sources for resident and migrating waterfowl. There have been population explosions of some species which appear to be related to nutrient pollution. Elodea canadensis and Myriophyllum spicatum have at times been plant pests, the latter being most serious during the last 10 years. Ruppia maritima has been very sensitive to increases in water turbidity. (See also W74-00891) (Woodard-USGS)
W74-00901

EMERGENT VASCULAR PLANTS OF CHESAPEAKE BAY WETLANDS,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
D. Higman.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-72--C-80, 1973. 3 tab, 17 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Vascular tissues, *Wetlands, Classification, Ecosystems, Ecology, Water pollution sources, Water pollution effects, Dredging, Engineering structures, Sewage effluents, Environmental effects, Salinity, Biology, Reviews, Bibliographies.
Identifiers: *Emergent vascular plant taxonomy.

Two annotated checklists have recently been compiled for vascular plants of the Chesapeake Bay and areas potentially subject to flooding by it (Krauss et al, 1971; Wass, 1972). The Maryland list of 421 species covers all land areas within the high tide limits of the Bay and its tributaries, both in Maryland and Virginia. The Virginia Institute of Marine Sciences (VIMS) list of 435 species is restricted to Virginia (including the barrier islands of the Atlantic seashore) and the Patuxent River estuary in Maryland. Both lists include the flora of salt and brackish marshes, beaches, and freshwater swamps. The VIMS also covers ponds and floodplains on tidal creeks and shores subject to storm wave inundation. Each list contains many species not found in the other, so together they probably comprise a fairly complete flora of Chesapeake Bay wetlands. Since the distribution of many salt marsh species depends to some degree upon salinity, engineering projects which alter the salinity of portions of the Bay likewise alter the floristic composition of salt marshes in the affected areas. Pollution by sewage raises the level of nutrients in salt marshes. Wass and Wright (1969) noted that Spartina spp. grows taller and has a darker green color than normal when sewage is present. During the growing season, salt marshes are able to absorb some of the excess nutrients which otherwise would create algal blooms in the estuaries. (See also W74-00891) (Woodard-USGS)
W74-00902

VASCULAR PLANTS OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
R. G. Brown, and J. L. Reveal.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-81--C-86, 1973. 40 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Vascular plants, *Aquatic life, Estuaries, Classification, Ecosystems, Ecology, Water pollution sources, Water pollution effects, Dredging, Environmental effects, Biology, Salinity, Reviews, Bibliographies.
Identifiers: *Vascular plant taxonomy.

Most of the vascular plants found in and around Chesapeake Bay are taxonomically well known and understood. The food produced by photosynthesis in vascular plants is of utmost importance. Much of this is consumed directly as fruits, seeds, or vegetative tissue by various mammalian and avian species of the marshes and open water. Vascular plants provide stability to aquatic and sandy habitats. Both of these habitats are currently being subjected to increasing stress from urbanization and from dredge and fill operations. It is lamentable that the technology that might permit artificial propagation of selected species (such as Zostera, Juncus, etc.) does not currently exist. Such technology could provide for reclamation of dredged areas, reduce erosion losses, and allow for a greater number of management options. Vascular plants are extremely sensitive indicators of environmental change. They have been suggested or used as indicators for air pollution levels, ambient radioactivity levels, chemical and nutrient levels of the substrate, and as microclimatological indicators. (See also W74-00891) (Woodard-USGS)
W74-00903

FREE-LIVING PROTOZOA OF THE CHESAPEAKE BAY EXCLUSIVE OF FORAMINIFERA AND THE FLAGELLATES,
Maryland Univ., College Park. Dept. of Zoology.
E. B. Small.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-87--C-89, 1973. 8 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Protozoa, Classification, Biology, Estuaries, Ecosystems, Ecology, Water pollution sources, Water pollution effects, Sewage effluents, Salinity, Environmental effects, Reviews, Bibliographies.
Identifiers: *Protozoa taxonomy.

The free-living protozoa discussed include the ciliaphora and amoeboid sarcodinids. The biology of the free-living protozoa within the Chesapeake Bay is understood only by analogy to those protozoan organisms studied in other estuarine communities. Protozoa generally feed on a wide variety of foodstuffs at the very base of the food pyramid (e.g. bacteria, fungi, unicellular algae, blue-green algae, other protozoa, tissues of metaphytan and metazoan organisms) and excrete nitrogen and phosphorus into their aquatic environments. Since bacteria are known to be a major component of waste water derived from sewage disposal plants, the bactivorous ciliates probably play a major role in and form a prominent part of the biomass living in highly polluted estuarine waters. (See also W74-00891) (Woodard-USGS)
W74-00904

FORAMINIFERA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Dept. of Paleobiology.
M. A. Buzas.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-90--C-91, 1973.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Protozoa, Classification, Estuaries, Ecosystems, Ecology, Water pollution sources, Water pollution effects, Sewage effluents, Environmental effects, Salinity, Water temperature, Oxygen, Reviews.
Identifiers: *Foraminifera taxonomy.

Chesapeake Bay Foraminifera have been inadequately studied. The Virginia Institute of Marine Sciences (VIMS) 1972 checklist cites 21 species belonging to seven families. New observations here have enlarged this to 28 species and 14 families. Two biofacies in the Rappahannock and Choptank estuaries contain as principals the genera Ammobaculites and Elphidium. In marshes the two principal biofacies are dominated by Miliammina and Ammoastuta. Monthly sampling with replicates at three stations over the period of a year in the Choptank River indicate that the genera Ammobaculites, Elphidium, and Ammonia vary in their periodicity among themselves as well as between stations. This periodicity can be accounted for in part by temperature, salinity, oxygen, chlorophyll a, b, and c. No single environmental variable can account for the observed periodicities. General linear models containing 15 parameters successfully accounted for the variability of each species. The distribution of the Foraminifera in the other rivers of the bay system are documented. The Foraminifera are mainly herbivores. In those species studied the principal food has been diatoms. Bacteria, however, have also been demonstrated as a requirement to successfully maintain some cultures. (See also W74-00891) (Woodard-USGS)
W74-00905

CTENOPHORES OF THE CHESAPEAKE BAY,
Richmond Univ., Va.
J. W. Bishop.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-92--C-95, 1973. 20 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Jelly fish, Classification, Estuaries, Aquatic life, Ecosystems, Ecology, Environmental effects, Water pollution effects, Nutrients, Food chains, Reviews, Bibliographies.
Identifiers: *Ctenophore taxonomy.

Ctenophores commonly are called water gulls, comb jellies, sea walnuts, and jellyfish. B. ovata ranges from the tropical Atlantic to the Chesapeake Bay. In the Chesapeake Bay, it is found at salinities above 15 ppt and is most abundant during late summer and early fall. Its abundance in the Bay may be controlled largely by hydrological factors. Field observations of the vertical distributions of ctenophores indicate that M. leidyi is found at a variety of depths, but is attracted to light and tends toward greater depths in rough weather and in low salinities. Smaller individuals concentrate within currents near the bottom and therefore may be carried upstream in an estuary. M. leidyi eats a wide variety of zooplankton up to about 6 mm in length. When it is abundant, crustacean zooplankton and oyster sets often are reduced. Its predatory activities can account for 73% of the total predation on small zooplankton in the York River and 52% of the daily mortality of the predominant copepod Acartia tonsa in the Patuxent River. Ctenophores eliminate about 90% of assimilated nitrogen and therefore may play an important role in recycling nutrients. (See also W74-00891) (Woodard-USGS)
W74-00906

CNIDARIA OF THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point.
D. R. Calder.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-96--C-99, 1973. 33 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Invertebrates, Jelly fish, Aquatic life, Classification, Ecosystems, Ecology, Estuaries, Water pollution effects, Environmental effects, Water temperature, Salinity, Oxygen demand, Reviews, Bibliographies.
Identifiers: *Cnidaria taxonomy.

The hydrozoans and scyphozoans of Chesapeake Bay are well known taxonomically. The four species of scyphomedusae occurring in the Bay are easily distinguished, and problems in the identification of their scyphistomae and ephyrae have been resolved. Ten species of anthozoans are known from the area, but the class has not been adequately studied. Well established common names exist for the scyphomedusae, including the sea nettle (Chrysaora quinquecirrha), the moon jelly (Aurelia aurita) and the lion's mane (Cyanea capillata). Only one hydroid, the abundant and conspicuous Sertularia argentea, has a common name. It is referred to as grass by fishermen and the silvery hydroid or thuiaria by marine scientists. Among anthozoans, Astrangia danae is called the star coral. Within the Hydrozoa, salinity and temperature optima vary widely from one species to another. Some (Cordylophora caspia, Moerisia lyonsi) are restricted to low salinities, while others (Tubularia crocea, Hydractinia echinata) occur only in higher salinities. Species composition changes markedly from summer to winter. With the possible exception of Nemopsis bachei, no species is known to remain active throughout the year. Scyphistomae are tolerant of low oxygen levels, although well oxygenated water may be necessary for strobilation. (See also W74-00891) (Woodard-USGS)
W74-00907

PRIAPULIDA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Office of Environmental Sciences.
R. P. Higgins.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-100--C-101, 1973. 1 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Invertebrates, Classification, Estuaries, Ecosystems, Ecology, Environmental effects, Water temperature, Salinity, Oxygen demand, Water pollution effects, Reviews.
Identifiers: *Priapulida taxonomy.

No priapulida have been reported for the Chesapeake Bay. This presentation is submitted on the basis that it is possible that one or more species could be present in the Bay. Two species have been reported from the eastern coastal waters of the U.S. (New England): Priapulus caudatus and Priapulopsis bicaudatus. Priapulids are widely distributed but usually prefer cold water habitats. One exception is Tubiluchus corallicola, found in shallow, tropical waters. If present in the Bay, they will fill a minor benthic predator niche and offer a negligible food source to vertebrates and invertebrates. Priapulids are capable of withstanding wide variations in salinity (4 ppt to 65 ppt) and moderately low oxygen concentrations (2 ml per liter). (See also W74-00891) (Woodard-USGS)
W74-00908

TARDIGRADA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Office of Environmental Sciences.
R. P. Higgins.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-102--C-104, 1973. 6 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Invertebrates, Classification, Estuaries, Ecosystems, Ecology, Environmental effects, Salinity, Sediments, Water pollution effects, Oxygen demand, Reviews, Bibliographies.
Identifiers: *Tardigrada taxonomy.

Tardigrades, occasionally called water bears, constitute a well defined taxonomic group of aquatic invertebrates rarely exceeding 1 mm in length. The greater number of described species are found in freshwater. Many species are ubiquitous, however very little is known about their distribution. Many species, several of which are marine, are capable of cryptobiosis (drying) and may be distributed by wind. Nine species have been reported from marine or estuarine environments on the eastern U.S. coast. Four of these are reported from Chesapeake Bay: Batillipes mirus, B. bullacaudatus, Stygarctus bradypus and Halechiniscus remanei. Considering the habitats of Chesapeake Bay, many marine and freshwater species should be expected in collections of meiobenthic invertebrates. Although the average sediment sample contains very few tardigrades, many thousands per cubic liter may occur in some habitats, especially in moist beach sand. Tardigrades feed on algae and other plants and small invertebrates, including other tardigrades. Post-embryonic development is direct. Some tardigrades are moderately tolerant of low oxygen tension and variation in temperature and salinities. (See also W74-00891) (Woodard-USGS)
W74-00909

KINORHYNCHA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Office of Environmental Sciences.
R. P. Higgins.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-105--C-107, 1973. 11 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Invertebrates, Classification, Estuaries, Ecosystems, Environmental effects, Salinity, Sediments, Water temperature, Reviews, Bibliographies.
Identifiers: *Kinorhyncha taxonomy.

To date no kinorhyncha has been reported from the Chesapeake Bay. Representatives of at least four genera--Pycnophyes, Trachydmus, Echinoderes, and Centroderes--are found. Kinorhynchs are widely distributed in marine and estuarine sediments from intertidal to abyssal depths, at salinities from 7 ppt to 60 ppt but more normally within a range of 18 ppt to 40 ppt and at all latitudes from the Arctic to Antarctic. Kinorhynchs are small (less than 1 mm), bilaterally symmetrical, appendageless pseudococlomate worms which have the distinction of being the only ascheleth with distinct external, (integument) and to some extent internal (muscles and nervous system) segmentation. They are an important and ubiquitous constituent of the meiobenthos in marine and estuarine sediments. They remain cryptic primarily because of difficulties in processing and identifying them. However, they generally constitute a moderately important part of the meiobenthos, serving as a source of food for sediment feeders, and themselves feeding on diatoms, other microalgae, and detritus. (See also W74-00891) (Woodard-USGS)
W74-00910

DIGENETIC TREMATODES OF THE CHESAPEAKE BAY,
Gulf Coast Research Lab., Ocean Springs, Miss.
R. M. Overstreet.
Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-108--C-110, 1973. 7 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Invertebrates, Classification, Ecosystems, Estuaries, Worms, Parasitism, Ecology, Environmental effects, Biology, Fish diseases, Reproduction, Reviews, Bibliographies.
Identifiers: *Trematode taxonomy, Flatworm, Parasites.

The taxonomy of Digenea from fishes and invertebrates from Chesapeake Bay is in need of considerable attention. The viscera from several preserved fishes from the Bay were examined for parasites for a list of parasites. Most of the fish were infected with Digenea and most were new records for the parasite to be found in the particular host/and in the Bay area. These findings suggest that Digenea are abundant and their distribution poorly known. The biology of several trematodes from near Woods Hole and from other areas along the Atlantic coast have been studied. Some of the studied worms probably occur in the Bay. In general, however, the life histories and other aspects of the biology of marine and estuarine trematodes are poorly understood. Digenea are especially valuable as indicators of environmental conditions. Molluscs are the first intermediate host for all known Digenea but two. In order for a trematode larva to infect a mollusc and asexually produce larvae capable of infecting a second intermediate host, the trematode must depend on both a receptive host and satisfactory environmental conditions. Proper conditions are also necessary for development in the second or addition intermediate hosts and in the definitive host. (See also W74-00891) (Woodard-USGS)
W74-00911

MOLLUSCS OF THE CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
H. T. Pfitzenmeyer.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-111--C-127, 1973. 154 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Mollusks, Classification, Esturaries, Invertebrates, Shellfish, Ecosystems, Ecology, Environmental effects, Water temperature, Salinity, Sediments, Water pollution effects, Biology, Reviews, Bibliographies.
Identifiers: Molluscs taxonomy.

Molluscs in Chesapeake Bay are generally well defined on the generic and specific level. The most comprehensive list for all molluscs of the Bay contains 121 species. It is most complete for the lower Bay area but also contains most of those species found in the Maryland or upper portion of the Bay. Most Bay research has centered on three commercial species, the oyster, Crassostrea virginica; the soft-shell clam, Mya arenaria; and the hard-shell clam, Mercenaria mercenaria. The oyster, the most economically important species, has been well studied with respect to its distribution and variable abundance in the Bay. Perhaps the greatest contribution any single mollusc makes towards the ecology of the Bay would be the formation of shell bars and reefs by oysters. The shell surfaces of live and dead oysters provide the necessary hard substrate and crevices for the attachment of a great number of animals and plants which cannot exist on mud or sand bottoms. Alteration of the Chesapeake Bay by chemical and physical means reduces populations of desirable food species for man or for other species lower in the food chain or creates an unhealthy environment. (See also W74-00891) (Woodard-USGS)
W74-00912

POLYCHAETES OF THE CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
D. H. Hamilton, Jr.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-128--C-131, 1973. 8 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Worms, Classification, Invertebrates, Estuaries, Ecosystems, Biology, Environmental effects, Sediments, Salinity, Water temperature, Water pollution effects, Reviews, Bibliographies.
Identifiers: *Polychaete taxonomy.

With the exception of larval stages, the taxonomy of the Chesapeake Bay polychaetes is well worked out, partially as a consequence of the restricted diversity of the fauna, which totals only about 110 species in all. Polychaetes are ubiquitously distributed in the Bay, colonizing not only sediments but also Aufwuchs (periphyton) communities, oyster bars, and virtually every other subsurface substratum. Members of the class occur throughout the range of salinities and temperatures encountered in the Bay. In sandy habitats they are second in importance among the macroscopic infauna only to the bivalves. In silt-clay habitats they are normally the most abundant macrofauna (greater than 1 mm. in shortest dimension) and constitute a major component of the biomass in all sediments. Polychaetes seem to be much more resistant to man-induced environmental changes than crustaceans or molluscs, and may be of particular value in the study of such problems. Recent work at Chesapeake Biological Laboratory has shown that even in grossly polluted areas of Baltimore Harbor, large populations of polychaetes may be found. Nereis succinea seems to occur preferentially and at considerable densities (400/sq.meter) in a partially anaerobic ooze with high organic content near Cove Point. (See also W74-00891) (Woodard-USGS)
W74-00913

FREE-LIVING COPEPODA OF THE CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
D. R. Heinle.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-132--C-135, 1973. 18 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Copepods, Classification, Esturaries, Invertebrates, Ecosystems, Biology, Ecology, Water pollution effects, Environmental effects, Salinity, Water temperature, Reviews, Bibliographies.
Identifiers: *Copepoda toxonomy.

Of the 73 species of copepods listed from Chesapeake Bay about five are abundant. The calanoid Acartia tonsa (Dana) is found throughout the year at all salinities but is most abundant from April to October. Population densities are commonly 100,000 to 200,000 individuals per cubic meter and sometimes exceed 1,000,000 during that period. During winter and early spring A. tonsais exceeded by the calanoids A. clausi at higher salinities and Eurytemora affinis (Poppe) at lower salinities. Acartia clausi occurs to salinities as low as 5 ppt (Baltimore Harbor) and E. affinis to salinities as high as 12 ppt (mid-Bay). Densities of both of these species are commonly in excess of 200,000 per cubic meter, and E. affinis at times exceeds 3,000,000. The relatively small Oithona brevicornis (Biesbracht) is found at higher salinities greater than 10 ppt all year but appears to breed during the summer months when it acheives greatest densities. This species is epibenthic in habit. Adults and immature copepodites of this species at times exceed 100,000 per cubic meter. The harpacticoid S. canadensis has pelagic nauplii which at times exceed 1,500,000 per cubic meter. The adults of this species are epibenthic. (See also W74-00891) (Woodard-USGS)
W74-00914

DECAPOD CRUSTACEANS OF THE CHESAPEAKE BAY,
National Marine Fisheries Service, Washington, D.C.
A. B. Williams.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-136--C139, 1973. 25 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Crustaceans, Classification, Esturaries, Biology, Ecosystems, Environmental effects, Salinity, Water temperature, Water pollution effects, Pesticides, Ecology, Reviews, Bibliographies.
Identifiers: *Decapod toxonomy.

Most of the decapod species found in the Chesapeake Bay are taxonomically stable. Manuals for identification and an annotated check list for Bay species are available which provide both systematic and distributional information. Salinity and temperature are the dominant factors governing distribution of estuarine animals. Some species are better adapted to life in Chesapeake Bay than others, and the abundant Callinectes, Palaemonetes and xanthid species, as well as some Uca, are dominant decapod crustaceans there. The remaining species listed range from accidental oceanic intruders, through seasonal residents, to moderately tolerant forms confined largely to the lower Bay. Upogebia and Polyonyx are tube dwellers, the latter a commensal with annelids as are some of the pinnotherid crabs, while two of the pinnotherids are essentially parasites in mollusks. Probably the most imperfect state of knowledge is that regarding reactions of these animals to induced environmental changes. Penaeus and Callinectes are differentially affected by pesticides and herbicides (DDT, Dibron, Antimycin A, Strobane, BHC, Dieldrin, Dursban, Parathion, 2-4-D acetamide, among those tested) depending on pollutant, concentration, and length of exposure. (See also W74-00891) (Woodard-USGS)
W74-00915

FISHES OF THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Goucester Point.
J. Musick, and M. L. Wiley.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-141--C-142, 1973.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Aquatic life, *Fish, Classification, Esturaies, Biology, Ecosystems, Environment effects, Water pollution effects, Dredging, Industrial wastes, Ecology.
Identifiers: *Fish taxonomy.

The fishes are a very conspicuous and important component of the fauna of Chesapeake Bay. The taxonomic status of the group is probably understood as well for the Bay as any other comparable geographic area but much work remains to be done at the subspecific and racial levels. Least known is the seasonal occurrence of large adult marine species, particularly sharks. Commercial fisheries catch statistics provide crude estimates of the relative abundance of commercially important species from year to year. Some species of fish inhabits nearly every available habitat within the Bay, and collectively they consume at all zooplankton (anchovies, silversides) and bottom invertebrates (hogchoker, white perch). Some are generalized predators (Striped bass) while others live mainly on molluscs (drums, cownosed rays), fishes (bluefish), or crustaceans (oyster toadfish). The effects of individual environmental changes (dredging, thermal or chemical pollution, etc.) have been determined for certain species. The possible effects of each one of all the major changes which have or are likely to occur in the Bay system have not been determined for a single species. (See also W74-00891) (Woodard-USGS)
W74-00916

AMPHIBIANS OF THE CHESAPEAKE BAY REGION,
Maryland Univ., Solomons. Natural Resources Inst.
J. D. Hardy, Jr.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report Append C, Vol 2, p C-143--C 153, 1973. 48 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Amphibians, Classification, Estuaries, Biology, Frogs, Salamanders, Toads, Ecosystems, Environmental effects, Water pollution effects, Pesticides, Ecology, Reviews, Bibliographies.
Identifiers: *Amphibian taxonomy.

A list of 43 species and subspecies of amphibians known to occur on the Atlantic Coastal Plain in the latitudes of Chesapeake Bay is presented. The range of Eurycea longicauda guttolineata ends abruptly at the Potomac River where it is replaced (but only west of the Fall Line) by Eurycea l. longicauda. Two disjunct populations of frogs occur in the Maryland portion of the Chesapeake Bay region: Gastrophryne carolinensis is known only from St. Marys, Calvert, and Dorchester Counties, while Rana virgatipes is limited to the southern portion of the eastern shore. Tadpoles are usually regarded as vegetarians, but are occasionally carnivourous, and sometimes cannibalistic. Salamander larvae and adult toads, frogs, and salamanders are entirely carnivourous, and primarily insectivorous. Studies of DDT accumulations in Acris crepitans, Rana pipiens, Rana clamitans, and Rana catesbeiana are reviewed. Adult frogs usually contain lower amounts of residues than fish, snakes, and birds. Even sublethal doses of DDT cause radically abnormal behavior in tadpoles. (See also W74-00891 (Woodard-USGS)
W74-00917

REPTILES OF THE CHESAPEAKE BAY REGION,
Maryland Univ., Solomons. Natural Resources Inst.
J. D. Hardy, Jr.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-154--C-164, 1973. 36 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Reptiles, Classification, Estuaries, Snakes, Turtles, Biology, Ecosystems, Environmental effects, Water pollution effects, Pesticides, Ecology, Reviews, Bibliographies.
Identifiers: *Reptile taxonomy.

Fifty-eight species and subspecies of reptiles are listed that occur in the Chesapeake Bay region. Three turtles (Clemmys insculpta, Clemmys muhlenbergi, and Malaclemys geographica) are predominately upland or northern species which reach the Atlantic Coastal Plain only at the head of the Chesapeake Bay. One snake, Regina septemvittata, is predominately a piedmont species, but encroaches on the coastal plain in both Maryland and Virginia. Most of the regional reptiles show a definite habitat preference, but are not wholly restricted to the preferred habitat. Regional lizards are predominately insectivorous, although all of them consume a variety of other invertebrates including snails, spiders, and millipedes, and large specimens of Eumeces occasionally eat young lizards and mice. Bay area snakes are all carnivorous, and the food varies greatly from species to species. Certain water snakes subsist almost exclusively on frogs and fish while the king snake, Lampropeltis getulus, frequently feeds on other reptiles including the copperhead, Agkistrodon contortrix. DDT is known to be especially dangerous to reptiles, especially those which feed on insects. (See also W74-00891) (Woodard-USGS)
W74-00918

WATERFOWL OF THE CHESAPEAKE BAY,
Bureau of Sport Fisheries and Wildlife, Jamestown, N. Dak. Northern Prairie Wildlife Research Center.
R. E. Stewart.

In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report Append C, Vol 2, p C-165--C-170, 1973. 22 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Waterfowl, Classification, Estuaries, Birds, Ducks (Wild), Geese (Wild), Aquatic life, Biology, Ecosystems, Ecology, Environmental effects, Water pollution effects, Reviews, Bibliographies.
Identifiers: *Waterfowl taxonomy.

Many species of bird, other than waterfowl, are characteristic inhabitants of regular occurrence on one or more habitats of Chesapeake Bay during appropriate seasons of the year. These total 75 species and represent 22 families: Gaviidae (loons), 2 sp.; Podicipedidae (Grebes), 3 sp.; Sulidae (Gannets), 1 sp.; Phalacrocaracidae (cormorants), 1 sp.;Ardeidae (herons), 9 sp.; Accipitridae (hawks and eagles), 3 sp.; Pandionidae (ospreys), 1 sp.; Falconidae (falcons), 2 sp.; Rallidae (Rails and coots), 7 sp.; Charadriidae (plovers and turnstones), 4 sp.; Scolopacidae (snipe, sandpipers, etc), 13 sp.; Laridae (gulls and terns), 11 sp.; Tytonidae (barn owls), 1 sp.; Strigidae (typical owls), 1 sp.; Alcedinidae (Kingfishers), 1 sp.; Hirundinidae (swallows), 2 sp.; Corvidae (crows), 2 sp.; Troglodytidae (wrens), 2 sp.; Motacillidae (pipits), 1 sp.; Parulidae (wood warblers), 1 sp.; Icteridae (Blackbirds, etc), 3 sp.; and Fringillidae (sparrows), 4 sp. For the majority of waterfowl, widgeongrass (Ruppia maritima) probably is the most important single food item. In many areas of Chesapeake Bay that were formerly important to waterfowl, the quality of habitat has deteriorated greatly during recent years mainly because of pollution and increasing turbidity. (See also W74-00891) (Woodard-USGS)
W74-00919

CURRENT STATUS OF THE KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS IN CHESAPEAKE BAY,
Maryland Univ., Prince Frederick. Hallowing Point Field Station.
J. A. Sherk, Jr.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-172--C-183, 1973. 47 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Sediment transport, *Sediments, Inflow, Streamflow, Erosion, Sedimentology, Ecosystem, Biology, Environmental effects, Turbidity, Bottom sediments, Suspension, Aquatic life, Reviews, Bibliographies.

Particulate material in the Chesapeake Bay can originate from organic/and inorganic particles carried in by rivers, atmospheric fallout, biological activity, chemical reactions, resuspension from the bottom, disposal of wastes, and shore erosion. The particles carried in by rivers can be rock and mineral fragments such as quartz, feldspar, and mica (including clay) which serve as a substrate for microorganisms and affect light transmission in the water column. In addition, organic matter fragments can make up about 26% (160,000 tons) of the total seston entering the Upper Bay from the Susquehanna River. The two major sources of suspended material to the Upper Bay the Susquehanna River. The two major sources of suspended material to the Upper Bay are the Susquehanna River (670,000 tons/year) and shore erosion 100,000 tons/year). Most of the Susquehanna contribution for 1966 occurred during Spring runoff with about 90% of this material remaining in the northern Bay area. Particles suspended in the water column can impair light penetration and thus limit primary productivity by limiting the column of water in which light intensity is sufficient (about one percent of incident light) for the rate of photosynthesis to exceed respiration. Resuspended sediments exert an oxygen demand on the order of eight times that of the same material in bottom deposits. (See also W74-00891) (Woodard-USGS)
W74-00920

CURRENT STATUS OF KNOWLEDGE CONCERNING THE CAUSE AND BIOLOGICAL EFFECTS OF EUTROPHICATION IN CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
D. A. Flemer.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report Append C, Vol 2, p C-184--C-192, 1973. 28 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Eutrophication, *Water pollution effects, Nutrients, Nusance algae, Biochemical oxygen demand, Estuaries, Reviews, Bibliographies.

The Chesapeake Bay is in serious future danger from nutruent enrichment. It could be the most intractable problem that management will face during the next few years. There are obviously limits to the solution of nutrient pollution by dilution, even for a large estuary. Major areas of phytoplanktonic standing crop and nutrient loading in Chesapeake Bay, especially N and P, have been identified. In addition, the tributaries of the upper Bay are rapidly showing signs of deterioration. The blue-green alga, Anacystis sp. has appeared as objectionable blooms since the summer of 1968 in the Elk River. There is a tendency for the blue-green pulses to appear earlier, last longer, and cover more area. Observations on the upper Patuxent estuary are interesting since winter concentrations of inorganic N and P often approach those reported for the upper Potomac and James subestuaries. Yet, nuisance blue-green algae have not overtaken the Patuxent to date. There is the possibility that the well developed marsh system in the upper Patuxent estuary serves as a natural tertiary treatment system. (See also W74-00891) (Woodard-USGS)
W74-00921

CURRENT STATUS OF KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF HEAVY METALS IN THE CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Medicine.
J. M. Frazier.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report Append C, Vol 2, p C-193--C-201, 1973. 35 ref.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Heavy metals, Water pollution effects, Trace elements, Chemical wastes, Toxicity, Ecosystems, Bottom sediments, Aquatic life, Fish, Shellfish, Ecology, Mercury, Cadmium, Copper, Zinc, Reviews, Bibliographies.

Man's activities introduce heavy metals into the Chesapeake Bay system by many pathways, some of which are documented and others for which little information is available. The distribution, magnitude and characteristics of point sources such as industrial and domestic outfalls, dumping sites, and dredging projects have been investigated by the Environmental Protection Agency through the Annapolis Technical Laboratory, the Maryland Environmental Service, and the Virginia Institute of Marine Science (VIMS), but the heavy contributions of the more diffuse sources such as agricultural runoff, the flushing of urban areas during heavy rains, and the scrubbing out of air pollutants by precipitation and dry fallout are inadequately determined. The physical cycling of heavy metals in the system by means of dilution, current dispersion, turbulent diffussion, and sedimentation are fairly well understood; however, the chemical cycling through such processes as absorption, ion exchange, complex formation, chelation, flocculation, and coprecipitation have been poorly studied. There exist some data on the levels of heavy metals in marine organisms of the Chesapeake Bay. The Hg in blue crab, Callinectes sapidus, oysters, Crasostrea virginica, eels, Anguilla rostrata, white perch, Morone americana, catfish, Ictalurus spp. and striped bass, Morone saxatilis, has been measured, levels of which never exceeded the FDA standards of 0.5 ppm. (See also W74-00891) (Woodard-USGS)
W74-00922

CURRENT STATUS OF RESEARCH ON THE BIOLOGICAL EFFECTS OF PESTICIDES IN CHESAPEAKE BAY,
Westinghouse Ocean Research Lab., Annapolis, Md.
T. O. Munson, and R. J. Huggett.
In: Army Corps of Engineers Chesapeake Bay Existing Conditions Report, Append C, Vol 2, p C-202--C-205, 1973.

Descriptors: *Chesapeake Bay, *Water resources development, *Biota, *Pesticides, *Water pollution effects, Water pollution sources, DDT, Toxicity, Fish, Biology, Ecosystems, Ecology, Sediments, Shellfish, Anadromous fish, Estuaries, Reviews.

Very little is known about the biological effects of pesticides in the Chesapeake Bay. Although some information is available from laboratory studies about the short and long-term toxicities of certain persistent pesticides relative to some of the species found in the Bay, only in a few isolated cases have mortalities observed in the field been known to be directly attributable to pesticides. During a program to examine the role of an anadromous fish, the alewife, in pesticide transport, samples from the Potomac, James, and Rappahannock Rivers were analyzed. Apparently the alewives picked up Pesticides on their journey up the Bay, because the ones taken in the rivers had much higher pesticide levels than the ones taken from the ocean at the mouth of the Bay. During the period 1965-1970, 88 oyster samples collected by the Maryland State Department of Natural Resources were analyzed by the State Department of Mental Health and Hygiene. Of the 81% of the samples which contained DDT residues, most fell in the 0.011 to 0.011 ppm range, with the highest value being 0.070 ppm. (See also W74-00891) (Woodard-USGS)
W74-00923

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX D--MAP FOLIO.
Corps of Engineers, Baltimore, Md.

1973, 53 P.

Descriptors: *Chesapeake Bay, *Water resources development, *Land resources, *Land use, *Maps, Shores, Geology, Geomorphology, Contours, Altitude, Sediments, Topography, Water resources, Water supply, Recreation facilities, Electric powerplants, Beach erosion, Navigation, Projects, Aquatic plants, Eutrophication, Sport fishing, Commercial fishing, Wetlands, Wildlife, Water pollution.

Appendix D, a map folio of the Chesapeake Bay Existing Conditions Report, has been structured to provide the reader with a visual information supplement to Appendices B and C. Composed of plates which are too large to appear in the appendices themselves, Appendix D presents a visible recognition of project locations and problem areas associated with data presented in the other appendices. The plates refer to such data as land use, groundwater, water supply, recreation, power, beach erosion, navigation, noxious weeds, and fish and wildlife. It is also intended that through comparison of these plates some of the conflicts in water resource development around the Bay area

will be delineated. A list of the specific plates is indexed for easy reader orientation. Plates are numbered in relationship to the individual appendix and specific chapter with which they are associated. (See also W74-00887 thru W74-00891) (Woodard-USGS)
W74-00924

DYNAMIC WATER QUALITY FORECASTING AND MANAGEMENT,
Manhattan Coll., Bronx, N.Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W74-00927

OCEAN WASTE DISPOSAL IN SELECTED GEOGRAPHIC AREAS.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 05E.
W74-00928

TROPHIC STRUCTURE AND BIOACTIVITY OF THE PLANKTON COMMUNITIES IN LOWER REACH OF ELBE ESTUARY: CRITERIA FOR SAPROBIC CLASSIFICATION OF A TIDAL WATER (IN GERMAN),
For primary bibliographic entry see Field 05C.
W74-01003

CIRCULATION IN THE BAY OF AMPASINDAVA (MADAGASCAR) AND ITS BIOCHEMICAL IMPLICATIONS (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceanographique (ORSTOM) de Nosy-Be.
For primary bibliographic entry see Field 05B.
W74-01005

SILICATE IN THE WATER OF THE BAY OF VIGO (IN SPANISH),
Instituto de Investigaciones Pesqueras, Vigo (Spain). Laboratorio de Investigaciones Pesqueras.
M. Lopez-Benito.
Invest Pesq, Vol 36, No 2, p 273-282, 1972, Illus, English summary.
Identifiers: Bays, Seasonal, *Silicates, *Spain (Vigo Bay).

A study was made of the silicate distribution during 1970, in a station of the Ria Vigo, Spain. A higher silicate concentration was observed in the area of Rande and the inlet of San Simon. In station 3, low values of silicate occurred from Feb. to April (2.5-4 micro M SiO2/1). From May to Aug. the values remained between 5 and 8 micro M SiO2/1. In Sept. and Oct. the values decreased again to 1.66 micro M SiO2/1. Finally, a sudden increase was observed (14-14.26 micro M SiO2/1) in Nov. and Dec.--Copyright 1973, Biological Abstracts, Inc.
W74-01007

CHANGES OF PLANT COMMUNITIES IN OVERGROWN BODIES OF WATER OF THE AMU-DARYA DELTA, (IN RUSSIAN),
M. T. Tadzhitdinov, and K. N. Butov.
Ekologiya. Vol 3, No 2, p: 64-68. 1972.
Identifiers: *Deltas, *Phragmites-Communis, Plant communities, *USSR (Amu-Darya delta), Willow.

The effect of change in the water regime on overgrowth of the Aralsk (USSR) basin is reported. The dominating factor or factors which contribute to this ecological problem is the formation of superficial young cane or reed (Phragmites communis Trin.) which can withstand temporary drowning and debris from the river. The willow also plays an important role; they can be found all over the delta, and with the cane and a number of other plants, they contribute to the overgrowth of the water-ways. The movement of the sea and its shore also contribute to the problem. A stepwise discussion of the various contributing factors such as depth of water and the name of the various plants is presented.--Copyright 1973, Biological Abstracts, Inc.
W74-01018

LOUISIANA GOVERNMENT AND THE COASTAL ZONE-1972.
For primary bibliographic entry see Field 06E.
W74-01028

WETLANDS '73: TOWARD COASTAL ZONE MANAGEMENT IN LOUISIANA.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.

Annual report. March, 1973. 7 p, 4 append.

Descriptors: *Planning, *Coastal marshes, *Environmental effects, Wetlands, Ecosystems, Land use, Financing, Salinity, Erosion, Administration, Institutions, *Louisiana.
Identifiers: *Coastal zone management, Coastal Zone Management Act, Public participation, Federal assistance.

The Louisiana Advisory Commission on Coastal and Marine Resources is charged with developing a long term plan for the orderly development and management of the coastal zone. This task is becoming increasingly important because of the recent passage of the federal Coastal Zone Management Act which provides assistance for state management efforts and because Louisiana citizens are now showing great concern over several proposed projects in coastal zone areas. The report recommends that the state take full advantage of the federal act by providing funds to continue state planning efforts and that the state become a leader in coastal zone management programs. Discussed briefly are four elements of a coastal zone management program: (1) representation of diverse interest groups; (2) citizen involvement; (3) utilization of the best available scientific and technical assistance; and (4) intensive study and analysis of the coastal zone problems and opportunities. Some of the planning and management concepts and principles to be included in the programs are the delineation of environmental management units, the use of ecosystem approaches to analyze the natural processes involved, the restriction of certain land uses, the use of various control structures to prevent erosion and salt water intrusion, and the possible diversion of fresh water into the coastal areas to control salinity. (Elfers-North Carolina)
W74-01043

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

WATER REUSE IN INDUSTRY, PART 4 -- METAL FINISHING,
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
For primary bibliographic entry see Field 05D.
W74-00797

FIVE YEAR EXTENSION FOR RESEARCH AND DEVELOPMENT, PUBLIC LAW 92-60 (FINAL ENVIRONMENTAL STATEMENT).
Office of Saline Water, Washington, D.C.
Available from the National Technical Information Service as EIS-AA-73-02 66-F $7.00 in paper copy, $1.45 in microfiche. February 12, 1973. 84 p, 1 append.

Descriptors: *Environmental effects, *Desalination, *Saline water, *Water resources development, Desalination, Water pollution sources, Water quality control, Economics, Water properties, Irrigation water, Water quality, Legislation, Use of water, Alternative water use, Competing use, Quality control, Federal government.
Identifiers: *Environmental Impact Statements.

This environmental impact statement concerns the five-year extension of research and development projects and programs to improve desalting technology in accordance with Public Law 92-60 (PL 92-60). The research and development projects and programs that will be carried out under PL 92-60 are not expected to affect the environment significantly. Operations at the test facilities have been reassessed and found to have no significant environmental effects. Facilities are monitored on a continuing basis to assess and to minimize environmental impact. Alternatives considered include surface water development, groundwater development, improved water management practices, weather modification to increase precipitation, and recycling of sewage treatment and industrial plant effluents to industrial, agricultural, and municipal uses. This five-year extension of the Saline Water Conversion Program will provide for the development and demonstration of practical means to convert saline water and other chemically contaminated water to a quality suitable for municipal, industrial, agricultural, and other beneficial uses. (Mockler-Florida)
W74-00876

A SUMMARY REPORT MASTER WATER AND SEWERAGE PLAN.
CIM, Inc., San Luis Obispo, Calif.
For primary bibliographic entry see Field 05D.
W74-01041

SALINE WATER CONVERSION RESEARCH, 1972 ANNUAL REPORT.
California Univ., Berkeley. Sea Water Conservation Lab.

University of California Water Resources Center Desalination Report No. 52. March 1973. 99 p.

Descriptors: *Desalination, Desalination apparatus, *California, Ion exchange, Membrane processes, Distillation, Alternative water use.

Progress made in desalination and sea water conversion research conducted at the Sea Water Conversion Laboratory of the University of California, at Richmond, California is reported. Progress reports are included on several basic desalination approaches including development of new methodology and an evaluation of alternative techniques, distillation studies, ion exchange studies, and membrane processes. Both State of California and Federally funded research activities are described. (Snyder-California)
W74-01049

SALINE WATER RESEARCH, PROGRESS SUMMARY, JANUARY 1, 1972 - DECEMBER 31, 1972.
California Univ., Los Angeles. School of Engineering and Applied Science.

University of California Water Resources Center Desalination Report No. 53, January 1973, 67 p.

Descriptors: *Desalination, Desalination apparatus, *California, *Demineralization, Corrosion control, Semipermeable membranes, Mass transfer, Scaling, Heat transfer, Electrolytes.

Progress made in desalination research conducted at the School of Engineering and Applied Science of the University of California at Los Angeles is reported. Progress reports on demineralization studies using semipermeable membranes, mass transport of electrolytes in membranes, scale control studies, heat and mass transfer studies, and corrosion studies are included. (Snyder-California)
W74-01050

3B. Water Yield Improvement

SAMPLING REQUIREMENTS FOR AREAL WATER EQUIVALENT ESTIMATES IN FORESTED SUBALPINE WATERSHEDS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. F. Leaf, and J. L. Kovner.
Water Resources Research, Vol 8, No 3, p 713-716, 1972. 2 fig, 1 tab, 11 ref.

Descriptors: Coniferous forests, Mountain forests, Snow cover, Snow management, Snow surveys, Snowfall, Snowmelt, Snowpacks, *Water equivalent, Water yield, *Watershed management, *Colorado, *Forest watersheds.
Identifiers: *Snowpack sampling, Snow storage, *Subalpine watersheds.

Statistical analyses were made of the snow course measurements on a 714-acre forested subalpine watershed in central Colorado where melt rarely occurs during the winter snow accumulation season. The following guidelines were developed for sampling mountain snowpacks on an areal basis: (1) sampling zones should be stratified by elevation, the sampling in each zone being proportional, and (2) sampling points should be widely spaced over each zone, two duplicate measurements at most being made at a location. (Forest Service)
W74-00675

ANNUAL STREAMFLOW SUMMARIES FROM FOUR SUBALPINE WATERSHEDS IN COLORADO,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. F. Leaf, and G. E. Brink.
USDA Forest Service General Technical Report RM-1, 1972. 24 p.

Descriptors: *Colorado River Basin, Coniferous forests, *Demonstration watersheds, *Runoff, Snowmelt, Stream gages, *Streamflow, Surface waters, Hydrologic data.
Identifiers: Fraser Experimental Forest, *Subalpine watersheds.

Streamflow runoff summaries are presented for four experimental watersheds near Fraser and Steamboat Springs, Colorado. Interval of published record varies from 1943-71 at Fraser to 1967-71 at Steamboat Springs. (Forest Service)
W74-00676

WATER YIELD CHARACTERISTICS OF THREE SMALL WATERSHEDS IN THE NORTHEASTERN BLACK HILLS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. K. Orr, and T. VanderHeide.
USDA, Forest Service Research Paper RM-100, February 1973. 8 p, 6 fig, 3 tab, 3 ref.

Descriptors: *Precipitation, *Water yield, Hydrology, *Watershed management, Evapotranspiration, Water yield improvement, Hydrogeology, Coniferous forests, Mountain forests, National Forests.
Identifiers: *Ponderosa pine forest, *Black Hills, Mountain watersheds.

Three small forested watersheds (217, 89, and 190 acres) on a laccolith in the northeastern Black Hills have yielded surface runoff equivalent to 7.12, 7.57, and 6.51 inches or 25, 27, and 23 percent of average annual precipitation, water years 1964-69 inclusive. Losses, assumed near the equivalent of evapotranspiration (stream gages are tightly sealed on bedrock) have averaged 21.1, 20.3, and 21.6 inches respectively. The greatest loss has occurred from the watershed having the greatest volume of timber per acre, the deepest soil, and the gentlest gradient. Timber is presently being harvested on one watershed for evaluation of the effects of such treatment on water yield and quality. (Forest Service)
W74-00677

SIMULATING EFFECTS OF HARVEST CUTTING ON SNOWMELT IN COLORADO SUBALPINE FOREST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04C.
W74-00686

THE EFFECT OF OVERSTORY REMOVAL UPON SURFACE WIND IN A BLACK SPRUCE BOG,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
J. M. Brown.
USDA Forest Service Research Note NC-137, 1972. 2 p, 1 fig, 1 tab, 4 ref.

Descriptors: *Winds, *Meteorology, Microenvironment, *Watershed management, *Wetlands, Clear-cutting, Coniferous forests, Energy transfer, Evapotranspiration, Advection, *Minnesota, Bogs, Demonstration watersheds.
Identifiers: *Black Spruce canopy, Strip-cutting.

Wind passage was measured over a black spruce canopy, at the surface under the canopy, and in a clearcut strip in a northern Minnesota bog. During a 40-day period wind below the canopy was 10 percent of that above the canopy while the wind in the clearcut strip was 45 percent of the total above the canopy. Wind at the surface of the clearcut strip was of longer duration and greater velocity than under the black spruce canopy. (Forest Service)
W74-00688

EFFECT OF SNOW FENCE HEIGHT ON WIND SPEED,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. D. Tabler, and D. L. Veal.
Bulletin of the International Association of Scientific Hydrology, Vol XVI, No 4, p 49-56, December 1971. 5 fig, 1 tab, 7 ref.

Descriptors: Winds, *Windbreaks, *Wind velocity, *Shelterbelts, Snow cover, Blizzards, Snow management, Snowpacks, Watershed management.
Identifiers: *Snow fences, Snow drifting, Snow transport, Snow deposition, Blowing snow, Induced snow accumulation, *Snowdrifts.

Wind speeds were measured to windward and to leeward of vertical-slat snow fences 6, 8, 10, 12, and 16 ft tall. The down-wind measurements were made at distances of 2.5H, 5H, and 10H from the fence, where H is fence height. Speed measurements at various heights were integrated up to the height of the fence, and the percentage reduction in wind speed was calculated. Results indicated that total wind speed reduction was proportional to the 1.5 power of fence height. (Forest Service)
W74-00691

SOIL WATER DEPLETION BY A HARDWOOD FOREST IN SOUTHWESTERN WISCONSIN,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
R. S. Sartz.
Soil Science Society of American Proceedings, Vol 36, No 6, p 961-964, 1972. 4 fig, 2 tab, 11 ref.

Descriptors: *Water yield improvement, *Vegetation effects, *Watershed management, Water balance, Clearcutting, Forest soils, Soil water, Field capacity, Soil water movement, *Wisconsin.
Identifiers: *Soil water depletion, *Hardwood forests.

Soil water depletion by cut and uncut forest on a north slope was measured for 3 years with a neutron meter. Depletion by the uncut forest began early in the growing season at all depths measured and continued at a nearly constant rate until leaf fall. Seasonal depletion in a 1.5 m soil mantle averaged 188 mm on uncut plots, 87 mm on clearcut plots, and 57 mm on plots without vegetation. The amount of depletion increased with mantle depth; thus cutting had a greater water-saving effect on deeper soils. Estimates of evapotranspiration by uncut forest agreed closely with empirical estimates of potential evapotranspiration. (Forest Service)
W74-00693

DESIGN OF A WATERSHED SNOW FENCE SYSTEM, AND FIRST-YEAR SNOW ACCUMULATIONS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. D. Tabler.
In: Western Snow Conference, Billings, Montana, April 1971 Proceedings. Vol 39, p 50-55. 7 fig, 2 ref.

Descriptors: *Snow management, *Snowpacks, *Water yield improvement, *Windbreaks, Snow cover, Water yield, Watershed management, Streamflow, Snowmelt, Water conservation, Shelterbelts, Blizzards, Winds, Water sources, Water equivalent, Water balance, Snowfall, Water storage, *Wyoming.
Identifiers: *Snow fences, Induced snow accumulation, Blowing snow, Snow transport, *Snowdrifts.

Inducing snow accumulation with fences in areas with insufficient natural barriers can materially increase total snow storage by reducing sublimative losses of wind-blown snow. A method has been developed to estimate the amount of blowing snow available at a snow fence site, whereby sublimation loss is considered to be a linear function of transport distance. Using this approach to determine the optimum capacity of the fence system, a 12 1/2-ft-tall fence, 1300 ft long, was built on a 111-acre watershed in 1969. The first winter after building the fence, peak snowpack water-equivalent was increased about 70%. Predicted snowpack water-equivalent was 1.0 area-inch, while the actual was 1.7 area-inches--an increase of about 6.5 ac-ft. If the snow fence continues to maintain total snow storage about 7 ac-ft per year above 'normal' over the anticipated 25-year project life, the value of the additional stored water-equivalent would have to be about $37 per ac-ft to amortize the initial $6500 construction cost. (Forest Service)
W74-00695

PHOTOGRAMMETRIC DETERMINATIONS OF SNOW COVER EXTENT FROM UNCONTROLLED AERIAL PHOTOGRAPHS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
A. D. Haeffner, and A. H. Barnes.
American Society of Photogrammetry Tech. Sess. Proc., p 319-340. 1972. 7 fig, 4 tab, 13 ref.

Descriptors: *Photogrammetry, *Remote sensing, *Aerial photography, *Snow cover, Rocky Mountain Region, *Colorado, Snow surveys, Streamflow forecasting, Hydrology, Small Watersheds.
Identifiers: *Rocky Mountains, Fraser Experimental Forest.

Efficient operation of water projects depends on the accuracy of streamflow forecasts. The accuracy of forecasts of snowmelt contribution to streamflow is improved if precise estimates of the areal extent of snow cover are available. A simple photogrammetric technique for determining the areal extent of snow cover from uncontrolled aerial photographs in mountainous terrain is described. A Wild STK-1 Stereocomparator with an attached digital card punch was used to delineate the snow areas and record the data. Since ground control was not available, only relative ground coordinates of the delineated areas could be computed from the parallax equation for overlapping vertical photographs. From these relative coordinates, a true snow cover percentage for the selected area was computed. Analysis of the technique revealed some operator judgment was required in deciding which snow patches to include and/or how detailed to delineate them. A maximum deviation of less than 4 percent of the mean resulted from the operator making repeated measurements on each of several stereo models containing snow cover ranging from 93 to 27 percent. (Forest Service)
W74-00697

SOILS AND WATER,
Forest Service (USDA), Asheville, N.C. Southeastern Forest Experiment Station.
W. T. Swank.
In: 11th Auburn Forestry Forum Proc. 1972. p 51-58, December 1972. 3 fig, 9 ref.

Descriptors: *Clearcutting, *Vegetation effects, *Watershed management, *Water yield improvement, Timing, *North Carolina, Water resources development, Hardwood, Demonstration watersheds.
Identifiers: *Appalachian Highlands.

A summary is presented of existing information on the effects of clearcutting forests on the quantity, quality, and timing of streamflow in the Appalachian Highlands. The statement was presented at a public hearing on applications and objections to clearcutting. (Forest Service)
W74-00698

3C. Use of Water of Impaired Quality

EL PASO'S WATER RESOURCES,
El Paso Water Utilities, Tex.
For primary bibliographic entry see Field 06D.
W74-00740

FACTORS OF CHEMICAL FERTILIZATION IN SALINE WATER IRRIGATION: A REVIEW,
Negev Inst. for Arid Zone Research, Beersheba (Israel). Dept. of Plant Introduction and Ecology.
M. Twersky.
Dec. 1971. 35 p, 151 ref.

Descriptors: *Saline water, *Irrigation water, *Crop response, *Agricultural chemicals, Ions, *Bibliographies, Fertilizers, Brackish water, Salt tolerance, Nutrients, Soil profiles.

The object is to focus significant points in current literature on problems of increasing plant production in arid and semi-arid areas with fertilizer practices and the increasing use of brackish water sources in combination with other marginal inputs. Development of irrigation agriculture in such regions and the shortage of good quality water for irrigation has turned many planners to consider the use of saline water in irrigation technology. The response of crop production to brackish water irrigation cannot be separated from that of nutrient fertilization. Improved response of plants to fertilization depends greatly upon water management systems. The following points are discussed: Characteristics and management of water quality, Effect of saline water and fertilizers on physiochemical reactions in the soil profile, Crop reaction to fertilizer nutrients and salt tolerance, and the Application of predictive models. The advantage of analytical models for calculating these interactions is emphasized. (Paylore-Arizona)
W74-00757

CHEMICAL AND BIOLOGICAL PATTERNS IN THE LOWER COLORADO RIVER SYSTEM,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 05C.
W74-00760

ECONOMIC FEASIBILITY OF AN INTEGRATED COTTONWOOD PLANTATION UTILIZING A NUCLEAR POWER REACTOR,
Battelle-Pacific Northwest Labs., Teheran (Iran).
B. W. Cone.
Journal of Forestry, Vol 70, No 10, p 620-623, Oct 1972. 1 illus, 2 tab, 4 ref.

Descriptors: *Irrigation, *Water utilization, *Forest management, *Crop production, *Cooling water, *Nuclear reactors, Nuclear power plants, Hardwoods, Economic feasibility, Water types, Irrigated land, Water reuse.
Identifiers: *Cottonwood (or Populus deltoides), Wood, Chips.

The irrigation of cottonwood (Populus deltoides) plantations with cooling water from a nuclear power generator was evaluated financially. It was found to offer sufficient profit incentives for the establishment of experimental test plots designed to estimate crop yields resulting under different spray regimes and applied water volumes. A cottonwood plantation could become a self-paying complementary enterprise for a nuclear power station if it were to yield 1300 cu ft per acre of marketable wood chips. (Witt-IPC)
W74-00771

WATER REUSE IN INDUSTRY, PART 2 -- TRANSPORT WATER,
Pavia-Byrne Engineering Corp., New Orleans, La.
For primary bibliographic entry see Field 05D.
W74-00795

EFFECT OF DETERGENT APPLICATION ON THE GROWTH OF CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
J. N. Judy, D. C. Martens, and W. Kroontje.
Journal of Environmental Quality, Vol 2, No 2, p 310-314, April-June 1973. 7 tab, 1 fig, 18 ref. OWRR-A-041-VA (2).

Descriptors: *Detergents, Waste disposal, *Phosphorus, Boron, Sodium chloride, *Clay loam, Statistical methods, Sands, *Virginia, *Corn (Field), Enzymes, Soils, Water reuse.
Identifiers: *Sandy loam, Soil pH, Statistical analysis, Norfolk soil, Davidson soil.

A greehouse experiment was conducted to determine the effects of two detergents on the growth of corn (Zea mays L.) on Davidson clay loam and Norfolk fine sandy loam. A heavy-duty non-enzyme detergent (Bz) and a heavy-duty enzyme detergent (Tx) wereapplied to the soils in watering solutions at concentrations of 0, 20, 800, 1600, 4800, 8000, 10,000, 12,000, and 14,000 ppm. Stimulations in growth occurred on the Davidson soil that received the 1600 ppm Bz or the 800, 1600, 4800, and 8000 ppm Tx solutions and on the Norfolk soil that received the 800 ppm Tx solution. These stimulations were attributed to responses to P contained in the detergents. Yield decreases occurred on the Dat received solutions containing 8000 through 14,000 ppm Bz or 14,000 ppm Tx, and on the Norfolk soil that received solutions containing 1600 through 14,000 ppm Bz or 4800 through 14,000 ppm Tx. These yield decreases were attributed to soluble salt damage from the Na salts contained in the detergents on all treatments, except where Tx was applied to the Norfolk soil. In the latter case, specific Na salt effects could not be separated from general salinity effects. Plants grown on the Davidson soil were more tolerant to detergent applications than those grown on the Norfolk soil, probably because of the greater salt retention of the former soil. It was concluded that the changes in soil pH and B availability due to detergent applications were not responsible for the yield decreases in this study.
W74-01057

3D. Conservation in Domestic and Municipal Use

SUBURBAN AMERICA: POPULATION DYNAMICS AS RELATED TO WATER RESOURCES PLANNING,
Wapora, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-00553

THE WATER BUDGET AND WASTE TREATMENT AT A MODERN DAIRY,
Mississippi State Univ., State College. Water Resources Research Inst.
For primary bibliographic entry see Field 05D.
W74-00560

SHORELINE MANAGEMENT INVENTORY.
Renton Planning Dep., Wash.
For primary bibliographic entry see Field 04A.
W74-00741

POLICY PLAN FOR DEVELOPMENT OF LANSING'S WATERFRONT.
Waterfront Development Board, Lansing, Mich.

April, 1973. 15 p.

Descriptors: *Planning, *Environmental effects, *Michigan, Water resources development, Urbanization, Natural resources, Land use, Social aspects, Administration, Economic impact.
Identifiers: Waterfronts, *Waterfront development, *Policy plan, *Lansing (Mich).

This report is Part III of the 'Plan for Development of Lansing's Waterfront'. Part I covers background including past and present waterfront proposals; Part II presents the analysis of trends, problems, and potentials for waterfront development. Recommendations based on the first two reports are presented in the form of goals, policies, and actions related to seven specific components of development: natural features, land use, transportation, economy, social issues, health issues, and governing bodies. The basic goals of the policy plan are to make the city a better place to live, to improve the image of the waterfront, to promote people oriented land uses on the waterfront and to encourage cooperation among adjacent units of government. Some of the policies include the encouragement of public access to the waterfront, the provision of waterfront areas for use by diverse groups of people, the provision of recreation and amenity potentials, the cooperation with businessmen and landowners to promote sound development, and the education of the public on the nature of waterfront areas. (Elfers-North Carolina)
W74-00742

PROTECTING OUR WATER ENVIRONMENT.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 05G.
W74-00743

REPORT TO THE GOVERNOR AND THE LEGISLATIVE COMMISSION: POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY.
Las Vegas Valley Water District, Nev.
For primary bibliographic entry see Field 05D.
W74-00744

SEWER SYSTEM COST ESTIMATION MODEL.
Voorhees (Alan M.) and Associates, Inc., McLean, Va.
For primary bibliographic entry see Field 05D.
W74-00745

A REPORT UPON WEST CENTRAL MARICOPA COUNTY, ARIZONA: VOLUME I, A STUDY OF PHYSICAL ENVIRONMENTAL FACTORS AS A BASIS FOR LAND USE PLANNING.
Maricopa County Planning and Zoning Dept., Phoenix, Ariz.

October, 1971. 53 p, 11 fig, 4 tab, 46 ref, 3 append.

Descriptors: *Planning, Water resources development, Geology, Physiographic provinces, Topography, Soils, Drainage, Floodplains, Irrigation, Groundwater, *Arizona, Subsidence, Hydrogeology, Urbanization.
Identifiers: *Environmental inventory, Salt River (Ariz), *Maricopa County (Ariz).

Environmental conditions in the study area, a 342 square mile area immediately west of Phoenix, are not unique insofar as the whole Salt River Valley is concerned. Factors evaluated include geology, physiographic processes, topography, soils, drainage, floodplains, geohydrology, subsidence due to groundwater withdrawal, irrigation, groundwater recharge, potential water sources, and water quality. Limitations to development result from drainage, water supply, and wastewater disposal. Waste usage is estimated at 556,200 acre-feet annually. The area's 50,000 people use only 11,200 acre-feet, while the remainder is consumed by irrigation. Average annual water input is only 326,900 acre-feet. The deficiency of water is obtained by depleting groundwater reserves. At present depletion rates groundwater will be exhausted by 2010. Two possible potential sources of water are the Central Arizona Project, which could provide 35,000-100,000 acre-feet annually and intensive use of wastewater effluents, which could provide 80,000-150,000 acre-feet. Water from any new sources will need more treatment than water now used, but treatment is said to be within reasonable economic limits. Maps, tables, and charts supplement the text. Land use planning based on this evaluation is discussed in Volume II. (Stein-North Carolina)
W74-00746

SOLID WASTE MANAGEMENT PLAN, COWLITZ AND WAHKIAKUM REGION.
Cowlitz, Wahkiakum Regional Planning Commission, Kelso, Wash.
For primary bibliographic entry see Field 05D.
W74-00747

RECONNAISSANCE ANALYSIS OF EFFECTS OF WASTE-WATER DISCHARGE ON THE SHALLOW GROUND-WATER FLOW SYSTEM, LOWER LAS VEGAS VALLEY, NEVADA,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 05B.
W74-00748

HONOLULU BOARD OF WATER SUPPLY ANNUAL REPORT FOR THE YEAR ENDED JUNE 30, 1972.
Honolulu Board of Water Supply, Hawaii.
For primary bibliographic entry see Field 06B.
W74-00749

LAMAR COUNTY: LAND USE SURVEY AND ANALYSIS, LAND USE PLAN, HOUSING, WATER AND SEWER, OPEN SPACE.
West Alabama Planning and Development Council, Tuscaloosa.
For primary bibliographic entry see Field 05D.
W74-00750

REGIONAL WATER SUPPLY/SEWAGE DISPOSAL PLAN AND SHORT-RANGE PROGRAM, 1973-1978.
Central New York Regional Planning and Development Board, Syracuse.
For primary bibliographic entry see Field 05D.
W74-00753

PRESENT AND FUTURE WATER USE AND ITS EFFECT ON PLANNING IN MARICOPA COUNTY, ARIZONA,
H. J. Thiele.
Prepared in cooperation with Maricopa County Planning and Zoning Department, Phoenix, Arizona. September, 1965. 59 p, 20 fig, 28 tab, 41 ref.

Descriptors: *Planning, *Water demand, *Water supply, *Forecasting, *Arizona, Groundwater mining, Water resources, Irrigation, Hydrogeology.
Identifiers: *Maricopa County (Ariz), Salinization, Phoenix (Ariz), Salt River (Ariz).

Because land use plans should consider water resources and their ability to serve a basin area, water supply and need in the metropolitan Phoenix portion of Maricopa County are analyzed. Three basic components of the study were a wateruse study, a water-resources study, and a water-utilization-potential study. Horizons for projections were 1980 and beyond. In 1963 almost 3 million acre feet of water were used annually in the metropolitan area, 88% being used for irrigation at an average rate of 4.84 acre-feet per acre of land annually. Over 100,000,000 acre-feet of groundwater lay beneath Phoenix but 1.3% was depleted that year. Consumptive use of 2.2 million acre-feet added 1.8 million tons of salt to underground reserves. Continued population increases in Phoenix are accompanied by declining potential for irrigating land. Water need decreases as irrigated land leaves productivity. Groundwater reserves decrease, however, until 2020 when use of the remaining 39 million acre-feet should be frozen until emergency needs dictate. The report forecasts 1.8 million people in the Phoenix area in 1980 and 3.2 million ultimately. Water demand at delivery points in 1980 will be 2.2 million acre-feet, less than in 1963, while ultimate demand at delivery points will be 1.8 million acre-feet, assuming no irrigation. It is estimated that the Salt River Project, Central Arizona Project, and reuse of treated effluent will be able to meet water demands indefinitely. Maps, charts and tables supplement the text. (Stein-North Carolina)
W74-00754

SUBJECTIVE DECISION-MAKING FOR URBAN WATER RESOURCES DEVELOPMENT,
Rockwell International Corp., Anaheim, Calif.
For primary bibliographic entry see Field 06B.
W74-00884

STORM DRAINAGE STUDY, (CHATHAM COUNTY-SAVANNAH, GEORGIA).
Chatham County-Savannah Metropolitan Planning Commission, Savannah, Ga.
For primary bibliographic entry see Field 04A.
W74-01031

(THE POTOMAC 1972).
Interstate Commission on the Potomac River Basin, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-01032

WATER AND SEWER SERVICE NEEDS OF LOW AND MODERATE INCOME HOUSEHOLDS IN METROPOLITAN WASHINGTON.
Metropolitan Washington Council of Governments, D.C.
For primary bibliographic entry see Field 05D.
W74-01034

ENVIRONMENTAL IMPACT STUDY FOR EXPANSION ON THE VILLAGE CREEK SEWAGE TREATMENT PLANT,
Advanced Technology Center, Inc., Dallas, Tex.
For primary bibliographic entry see Field 05D.
W74-01035

MASTER PLAN FOR MAJOR DRAINAGE: HENRY'S LAKE AREA, SUBBASIN 1-31-55-01-01.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 06B.
W74-01037

A PROGRAM FOR STORM DRAINAGE AND FLOOD CONTROL-1971-1990: DAMAGE PREVENTION, MAJOR DRAINAGEWAYS, MASTER PLANNING, REGIONAL MANAGEMENT.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 06F.
W74-01038

ANALYSIS OF PORT DEVELOPMENT POTENTIALS AT GREAT SODUS BAY.
Genesee/Finger Lakes Regional Planning Board, Rochester, N.Y.
For primary bibliographic entry see Field 06B.
W74-01039

PUBLIC WATER SUPPLIES OF NORTH CAROLINA, PART I NORTHERN PIEDMONT,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 06D.
W74-01040

AREAWIDE WATER AND WASTE WATER PLANNING STUDY FOR THE ST. CHARLES MESA, RYE-COLORADO CITY, AND BEULAH SECTORS OF PUEBLO COUNTY.
Sellards and Grigg, Inc., Lakewood, Colo.
For primary bibliographic entry see Field 05D.
W74-01047

WATER-RELATED FACILITIES STUDY FOR THE COMPREHENSIVE REGIONAL PLAN OF COLUMBUS AND FRANKLIN COUNTY (OHIO).
Burgess and Niple, Ltd., Columbus, Ohio.
For primary bibliographic entry see Field 06B.
W74-01048

3E. Conservation in Industry

POWER PLANT COOLING SYSTEM STILL USING SEWAGE EFFLUENT.
Zia Co., Los Alamos, N. Mex.
For primary bibliographic entry see Field 05D.
W74-00778

IMPROVING WATER ECONOMY OF A NORTHERN KRAFT BLEACH PLANT,
B. E. Werenskiold.
Paper Trade Journal, Vol 156, No 42, p 43-45, Oct 9, 1972. 4 fig.

Descriptors: *Water consumption, *Industrial water, *Pulp and paper industry, Temperature, Freshwater, Water types, Systems analysis, United States, Steam.
Identifiers: Kraft mills.

A systems engineering study of an integrated bleached kraft pulp, paper, and board mill in a northern U.S. location is reported. Its aim was to reduce water consumption under widely varying fluctuations in freshwater temperature. The mill's water input between the high-density brown-stock storage and the bleach plant thickener varied originally between 44,000 and 63,000 gal/ton of bleached pulp. The process changes adopted as a result of this study reduced this to less than 15,200 gal/ton. Further recommendations are made, aiming at a target input of 10,000 gal, with corresponding savings in direct steam demand of about 2,100,000 Btu/ton. (Witt-IPC)
W74-00792

WATER REUSE IN INDUSTRY, PART I -- POWER GENERATION,
Sargent and Lundy, Chicago, Ill.
For primary bibliographic entry see Field 05D.
W74-00794

WATER REUSE IN INDUSTRY, PART 2 -- TRANSPORT WATER,
Pavia-Byrne Engineering Corp., New Orleans, La.
For primary bibliographic entry see Field 05D.
W74-00795

WATER REUSE IN INDUSTRY, PART 3 -- MINE WATER,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 05D.
W74-00796

WATER REUSE IN INDUSTRY, PART 4 -- METAL FINISHING,
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
For primary bibliographic entry see Field 05D.
W74-00797

WATER REUSE IN INDUSTRY, PART 5 -- THE WATER POLLUTION CONTROL ACT: REACHING TOWARD ZERO DISCHARGE,
Polytechnic Inst. of Brooklyn, N.Y.
For primary bibliographic entry see Field 05D.
W74-00798

3F. Conservation in Agriculture

ESTABLISHING THE IMPACT OF AGRICULTURAL PRACTICES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. Dept. of Soil.
For primary bibliographic entry see Field 05B.
W74-00571

SPRAY DISPOSAL OF SEWAGE EFFLUENT,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00572

WHEAT RESPONSE TO SOIL MOISTURE AND THE OPTIMAL IRRIGATION POLICY UNDER CONDITIONS OF UNSTABLE RAINFALL,
Hebrew Univ., Jerusalem (Israel).
D. Yaron, G. Strateener, D. Shimshi, and M. Weisbrod.
Water Resources Research, Vol 9, No 5, p 1145-1154, October 1973. 2 fig, 6 tab, 17 ref.

Descriptors: *Irrigation efficiency, *Soil moisture, *Rainfall, *Stochastic processes, *Simulation analysis, *Decision making, *Optimum development plans, Computer models, Estimating, Irrigation practices, Crops, Water management (Applied), Systems analysis, Risks.
Identifiers: *Wheat yield, Irrigation policy.

Presented is a method for estimating a response fuction of wheat yield to soil moisture and for determining the optimal irrigation policy nunder conditions of stochastic rainfall. To determine such policy, information on the variation of the soil moisture over time as a function of depth is needed: A low-cost, computer simulation, soil moisture estimation model designed to reconstruct the soil moisture fluctuations (during the growing season of wheat) on the basis of incomplete data is described. Then, empirical estimates of the response function of wheat yield derived on the basis of a four-year irrigation experiment are presented; use is made of the Mitscherlich function. For the problem of deriving the optimal irrigation policy under conditions similar to those in the experiment (unstable rainfall), the soil moisture estimation model and the estimate of the Mitscherlich response functinons have been applied in an analysis in which the rainfall record representing the random rainfall distribution at the experiment site for a period of 16 years is taken into account. Two approaches to irrigation decision are considered, and several irrigating policies derived from the approaches are compared by simulating their consequences in relation to the 16-year rainfall record. (Bell-Cornell)
W74-00669

CORONADO RESOURCE CONSERVATION AND DEVELOPMENT PROJECT, PROGRAM OF ACTION.
Soil Conservation Service, Phoenix, Ariz.
For primary bibliographic entry see Field 04A.
W74-00755

JOJOBA AND ITS USES, AN INTERNATIONAL CONFERENCE, JUNE 1972.

University of Arizona, Office of Arid Lands Studies, Tucson, Arizona, June 1972. 81 p, 32 fig, 5 tab, 45 ref.

Descriptors: *Desert plants, *Xerophytes, Seeds, Seed treatment, *Planting management, Runoff, Plant populations, Crop production, Economic feasibility, Plant morphology.
Identifiers: *Jojoba, Liquid wax, Plant uses, Simmondsia chinensis.

Papers delivered at this first international conference on jojoba Simmondsia chinensis and its uses covered its distribution, chemistry of the seed, problems in the collection of seeds, and production under cultivation. Included were historical summaries and presentations of new research, especially in Israel, that will provide a basis for future developments. Experiments with planting, seed production potential, saponification and gas chromatographic analysis of jojoba wax esters, preparation of jojoba products, the effect of runoff farming for increased yields, and the need for additional agronomic and toxicity studies are discussed. The physical characteristics of the plant and its products are described, and the field experience with native stands in Arizona is delineated. The possibilities for commercial production as an Indian industry are shown. While enough seed may be collected from native stands for laboratory experiments, large-scale commercial use of its products will require plantations, such as have succeeded in Israel, and further research of jojoba as a horticultural plant, by determining desirable genetic prototypes and variability factors is needed. As an arid-lands plant requiring very little water even in its cultivated state, and one with great economic possibilities, it deserves attention. (Paylore-Arizona)
W74-00756

RELATIONSHIP OF TRANSPIRATION TO ATMOSPHERIC VAPOR PRESSURE,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 02D.
W74-00759

EMERGENCE OF BUFFEL GRASS (CENCHRUS CILIARIS) FROM SEED AFTER FLOODING,
Department of Primary Industries, Mackay (Australia). Agricultural Branch.
E. R. Anderson.
Queensl J Agric Anim Sci. Vol 29, No 3, p 167-172. 1972.
Identifiers: *Buffel grass, Cenchrus-Ciliaris, *Flooding (Plants), Grasses, Seeds.

The emergence of 7 buffel grass cultivars after simulated flooding for 0, 10, 20, 30 and 40 days in pots was investigated. Seed of known germination was planted in an alluvial clay soil of medium to heavy texture and flooding imposed immediately. Seedling emergency did not occur until flooding ceased, and emergence took longer in flooded treatments than in the control. Flooding caused a marked reduction in seedling emergence. The ability of the buffel grass cultivars to emerge was in the following order: American and Boorara greater than Biloela, Nunbank and Tarewinnabar greater than Gayndah and Molopo. The last 2 cultivars failed or had negligible emergence in all flooding treatments.--Copyright 1973, Biological Abstracts, Inc.
W74-00768

BLEACHING EFFLUENT FOR IRRIGATION,
Stephen F. Austin State Coll., Nacogdoches, Tex.
For primary bibliographic entry see Field 05D.
W74-00787

FLOODING TOLERANCE OF PANICUM COLORATUM,
Department of Primary Industries, Mackay (Australia). Agricultural Branch.
E. R. Anderson.
Queensl J Agric Anim Sci. Vol 29, No 3, p 173-179. 1972.
Identifiers: *Flooding (Plants), *Panicum-Coloratum, *Panicum-Maximum.

Five P. coloratum cultivars and 1 of P. maximum were flooded in pots. Flooding damage was assessed by visually rating the induced chlorosis, counting live tillers/pot and measuring percentage dry weight of the plants. Superior flooding tolerance was shown by the cultivar 'Kabulabula C.P.I. 14375' and variety makarikariense cvs. 'Bambatsi,' 'Burnett' and 'Pollock.' The results are compared with field information.--Copyright 1973, Biological Abstracts, Inc.
W74-00826

ADAPTABILITY OF MAIZE TO HIGH SOIL WATER CONDITIONS,
Indian Agricultural Research Inst., New Delhi. Div. of Agricultural Physics.
D. K. Das, and R. L. Jat.
Agron J, Vol 64, No 6, p 849-850, 1972.
Identifiers: Adaptability, *Aeration, Furrows, *Maize, Porosity, Ridges, *Roots, *Soil water, Zea-mays.

Maize (Zea mays L.) plants were grown in furrows and ridges in a lowlying sandy clay loam soil under high soil-water conditions. Root porosities of 44-day-old plants were studied. The investigation was

undertaken to determine varieties that could adjust to such environment through internal aeration. Varietal differences were found in the percentage of air space of roots. Plants grown in furrows had higher root porosities than those grown in ridges. Six cultivars studied were 'Kissan,' 'Deccan,' 'Jawahar,' 'Ganga 5,' 'Vikram' and 'Sona.' The first 2 may adjust better to excess soil water due to greater internal aeration resulting from increased root porosities.--Copyright 1973, Biological Abstracts, Inc.
W74-00892

EFFECTS OF WATER AND HEAT ON SEEDLING EMERGENCE,
Institute for Land and Water Management Research, Wageningen (Netherlands).
R. A. Feddes.
J Hydrol (Amst). Vol 16, No 4, p: 341-359. 1972, Illus.
Identifiers: Bean, Beet, Gardens, Heat, Irrigation, *Moisture, Radish, Rainfall, *Seedling emergence, Soils, Spinach, *Temperature, Water, *Germination.

The combined effect of soil temperature and moisture content on seedling emergence was studied with 4 different kinds of vegetable seeds radish, spinach, broad bean and garden beet, in field experiments in a clay and a sandy loam profile, both with a shallow and a deep groundwater table. Various sowing dates were applied. The mean daily temperatures of the plots with the higher groundwater tables were 1-2C lower than the temperature of the plots with the deeper groundwater tables. With the same groundwater depth, clay was warmer than sandy loams. The difference in groundwater level play a more important role than the difference in type of profile. The maxima and minima in the top soil were higher and the amplitudes decreased with depth faster in soils which had a deep groundwater table. The decrease was more marked in the clay than in the sandy loam soil. Seeds emerged earlier in sandy loam than in clay. The sandy loam plots with the shallow groundwater table showed the highest emergence rate as well as the highest total emergence percentage. The mean heat sums required for 50% emergence were lower on sandy loam than on clay, and the heat sums of the shallow groundwater plots were lower than those of the deep groundwater plots. The heat sum required for 50% emergence increased sharply below a matric pressure of -0.49 bar (above pF (water holding index) 2.7) of the soil. For a fast and adequate seedling emergence both a high temperature and a sufficient moisture content are necessary. By sprinkler irrigation the sowing bed can be kept at the desired moisture content.--Copyright 1973, Biological Abstracts, Inc.
W74-00930

COMPARATIVE DATA ON THE YIELD AND CHEMICAL COMPOSITION OF BEETS GROWN ON IRRIGATED AND DRY FARMS, (IN RUSSIAN),
L. A. Malieva.
Izv Akad Nauk Tadzh SSR Otd Biol Nauk. 2. p 15-22. 1971.
Identifiers: *Beets, Chemical composition, Comparative data, Dry farms, Irrigated farms, *Crop yield.

Data on the yield of beets, biomass of the tops, and chemical composition of the plant organs are presented. The beet varieties most promising for cultivation in Tadzhikistan, USSR, are given.--Copyright 1973, Biological Abstracts, Inc.
W74-00980

THE DEPENDENCE OF WATER REGIMEN OF PALMETTE TYPE APPLE TREES ON THE WATERING METHOD, (IN RUSSIAN),
M. N. Zhulavskaya, T. N. Medvedeva, P. I. Kolos, and I. A. Tulbure.
Izv Akad Nauk Mold SSR Ser Biol Khim Nauk. 5. p 31-37. 1971.
Identifiers: *Apple trees (Palmette), Trees, *Watering methods, *Metabolism, Water regimen.

There is a difference in water metabolism and utilization in the apple tree, depending on the mode of water delivery. Water delivered through sprinkling, especially at night, activates metabolism considerably. Water delivered through a trench shows high utilization from the soil.--Copyright 1973, Biological Abstracts, Inc.
W74-00981

STUDY OF ALGAE USED AS FOODS IN THE VALLEY OF MEXICO, (IN SPANISH),
Universidad Nacional Antonoma de Mexico, Mexico City.
For primary bibliographic entry see Field 02H.
W74-00982

THE USE OF TENSIOMETERS AS INDICATORS OF SOIL MOISTURE AVAILABILITY FOR PLANTS, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics.
N. A. Muromtsev, and I. I. Sudnitsyn.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 3, p 121-123. 1972. Illus. (English summary).
Identifiers: *Capillary pressure, Irrigation indicators, *Oats, *Soil moisture, *Tensiometers, Transpiration.

Capillary pressure (measured with tensiometers) at 0-0.5 atm corresponds to optimum soil moisture range for oats. The relative transpiration at this range is equal to unity but it decreases if capillary pressure goes below -0.5 atm. Tensionmeters can be used as indicators for irrigation.--Copyright 1973, Biological Abstracts, Inc.
W74-00989

EFFECT OF RETARDANT CHLOROCHOLINE CHLORIDE ON CONTENT OF PROTEIN COMPONENTS IN PLANT LEAVES DURING DROUGHT (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
N. N. Kharanyan.
Dokl Akad Nauk Sssr Ser Biol, Vol 205, No 2, p 492-494, 1972.
Identifiers: Bean, Chlorides, *Chloro choline chloride, Drought, Leaves, *Protein, Retardants, Wheat, *Amino acids.

Experiments with wheat and bean plants showed that the protein content in leaves of plants pretreated with chlorocholine chloride (CCC) during a drought is higher than in plants subjected to drought without CCC treatment (controls). The total quantity of free amino acids in the CCC-treated plants is lower than in the control plants. This fact may indicate a decrease of the breakdown of proteins in leaves of the CCC-treated plants under drought conditions, whereas protein breakdown and an increase of the content of amino acids are usually observed under these conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-00996

EFFECT OF GROWTH REGULATORS ON WATER METABOLISM IN PLANT: I, IAA, TIBA (2,3,5-TRIIODOBENZOIC ACID), GA (GIBBERELLIC ACID) AND CCC (2--CHLOROETHYLITRIMETHYLAMMONIUM CHLORIDE) ON HYDRATION OF TOMATO LEAVES AT VARIOUS S OIL MOISTURE CONTENTS, (IN POLISH),
Nicolas Copernicus Univ. of Torun (Poland). Pracownia Fizjologiczny Roslin.
A. Chrominski.
Zesz Nauk Uniw Mikolaja Kopernika Toruniu Nauki Mat-Przyr Biol. 14 p 189- 207. Illus, 1972. (English summary).
Identifiers: Benzoic acid, Gibberellic acid, *Growth regulation, Hydration, Leaves, *Metabolism, Osmotic potential, Soil moisture, *Tomato leaves.

CCC and IAA treatments decreased osmotic potential; TIBA increased it-it decreased leaf hydration. The intensity of IAA and TIBA action and the direction of changes resulting from the application of GA were dependent on soil moisture content. (See also W74-01027)--Copyright 1973, Biological Abstracts, Inc.
W74-01026

EFFECT OF GROWTH REGULATORS ON WATER METABOLISM IN PLANT: II. IAA, TIBA (2,3,5-TRIIODOBENZOIC ACID), GA (GIBBERELLIC ACID) AND CCC (2--CHLOROETHYLTRIMETHYLAMMONIUM CHORIDE) ON TRANSPIRATION RATE AND STOMATAL APERATURES O F INTACT TOMATO PLANTS, (IN POLISH),
Nicolas Copernicus Univ. of Torun (Poland). Pracownia Fizjologiczny Roslin.
A. Chrominski.
Zesz Nauk Uniw Mikolaja Kopernika Toruniu Nauki Mat-Przyr Biol. 14 p 209-228. Illus, 1972, (English summary).
Identifiers: Benzoic acid, Gibberellic acid, Growth regulation, *Metabolism, Soil moisture, *Stomatal aperatures, *Tomato, *Transpiration rate.

IAA, TIBA and CCC decreased, while GA increased, the transpiration rate. IAA and TIBA statistically significantly decreased stomatal aperatures. CCC insignificantly increased the stomatal apertures at low (25%) soil moisture and reduced the width of the stomata at normal (55%) soil moisture content. The effects of GA on behavior of the stomata were opposite to those of CCC. (See also W74-01026)--Copyright 1973, Biological Abstracts, Inc.
W74-01027

VARIATION IN SOIL FACTORS AND CROP YIELD ON A SANDY SOIL RICH IN ORGANIC MATTER, (IN NORWEGIAN),
O. Prestvik.
Meld Nor Landbrukshogsk. Vol 51, No 10, p 1-10, 1972. (English summary)
Identifiers: *Humus, *Organic matter, *Sandy soil, *Crop yield, Cation exchange, Soil chemistry.

In a coarse textured sand with humus content of 9-22% by weight in the upper layer, the water content and cation exchange capacity were positively correlated with humus content. Soil pH, soluble P and the degree of base saturation seemed to be negatively correlated with the content of organic matter. To a certain degree the crop yield varied in the same manner over the field from year to year. The yield was positively correlated with the humus content of the soil and also with other soil factors bound to the humus content. About 3/4 of the total variation in relative yield on an average for the period 1947-1951 could be explained by humus content and depth of the layer rich in humus: relative yield ± 62.11 + 1.78 loss of ignition (%) + 0.40 depth of upper layer rich in humus (cm). The content of organic matter partly reflects the production of plant mass. A good supply of water keeps the humus content high, resulting in high crop yield.--Copyright 1973, Biological Abstracts, Inc.
W74-01051

COMPARATIVE EFFICIENCY OF THE AREA UNIT USED FOR FISH BREEDING AND OTHER AGRICULTURAL PURPOSES, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
For primary bibliographic entry see Field 08I.
W74-01084

MOISTURE EXPENDITURE BY FOREST AND FIELDS IN THE PROTECTIVE AFFORESTATION REGIONS, (IN RUSSIAN),
A. I. Mikhovich, Ya. K. Zarudny, and V. E. Popova.
Lesovod Agrolesomelior Resp Mezhved Temat Nauchn Sb. 20. p 113-119. 1970.
Identifiers: Forests, Forestation, *Moisture, *Oak, *USSR (Ukranine), Agriculture, Soils.

Observations on moisture expenditure by forest stands and fields occupied by agricultural crops were conducted by the Ukrainian Scientific Research Institute of Forestry and by experimental stations in the Sumy, Donetsk, Voroshilovgrad (now Lugansk), Kirovograd, Kherson, Nikolaev and Vinnitsa regions of the Ukrainian SSR. Information is presented on the working methods, the characteristics of stands (age, height of stands, degree of stand closure) and of agricultural fields, with an indication of the field crop and the yield, as well as data on the total moisture expenditure by forest strips and fields. In the forest steppe and steppe of the Ukraine, it was established that the total moisture expenditure during the growing season by the young and middle-aged oak stands (in masses and in strips) is, as a rule, higher than the expenditure of the agricultural crops usual in these regions. In the 3-m thick layer of soil under forest strips and masses, less moisture was contained, as a rule, than in the neighboring field plots, though the spring reserves of soil moisture were almost equal to or even higher under forest.--Copyright 1973, Biological Abstracts, Inc.
W74-01099

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

TRAVEL TIME OF GEORGIA STREAMS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
A. M. Lumb.
Available from the National Technical Information Service as PB-224 848, $4.25 in paper copy, $1.45 in microfiche. Environmental Resources Center, Georgia Institute of Technology, Atlanta, Report ERC-1273, Sept. 1973. 80 p, 20 fig, 21 tab, 13 ref, 5 append. OWRR A-042-GA (1). 14-31-0001-3810.

Descriptors: *Natural streams, *Time, *Tracers, Dye releases, Time of concentration, Hydraulic properties, Streamflow, Flow measurement, Flow rates, Open channel flow, Discharge measurement, Backwater, Mannings equation, *Georgia, Computer programs, Path of pollutants.
Identifiers: *Average velocity, Stream velocity.

Estimates of the time of travel of flow in natural streams are important to the hydrograph routine necessary for the planning and operation of flood control systems and to the routing of pollution movement needed for water management programs. Such estimates are particularly important when reacting to accidental spills that can contaminate downstream water supplies. This study develops, through multiple regression analysis of data on Georgia streams, prediction equations more accurate than current office approximations and less costly than tracer or other field studies. Data from discharge measurements by the US Geological Survey at 145 complete record stations in Georgia were used with the Biomedical Computer Program, BMD02R, entitled 'Stepwise Regression.' Equations were developed for estimating average stream velocity, depth, width, and cross-sectional area from drainage area, mean basin elevation, mean annual precipitation, discharge and discharge frequency as the independent variables. Comparisions were made between travel times predicted from the equation for average stream velocity and travel times measured from dye-tracer studies. From the limited data available, it appears the equation for average velocity tends to underestimate travel times at high flows and over-estimate travel times at low flows. Only data for the north central and northwestern portions of Georgia were available for comparison.
W74-00556

SOCIAL AND CULTURAL IMPACT OF A PROPOSED RESERVOIR ON A RURAL KENTUCKY SCHOOL DISTRICT,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 06B.
W74-00557

A REPORT OF PROGRESS AND CONCLUSIONS, (WASHINGTON, D.C. METROPOLITAN AREA WATER RESOURCES).
Washington Area Interstate Water Resources Program, D.C.
For primary bibliographic entry see Field 06D.
W74-00583

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 9. COLORADO RIVER BASIN--VOLUME 2. COLORADO RIVER BASIN FROM GREEN RIVER TO COMPACT POINT.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00586

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS--VOL 3. UPPER MISSISSIPPI RIVER BASIN BELOW KEOKUK, IOWA.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00587

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 3. OHIO RIVER BASIN--VOLUME 4. OHIO RIVER BASIN BELOW WABASH RIVER.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00588

STREAMFLOW FORMATION, COMPUTATIONS, AND REGULATION (FORMIROVANIYE, RASCHETY I REGULIROVANIYE RECHNOGO STOKA).
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).

Ukrainskiy Nauchno-Issledovatel'skii Gidrometeorologicheskii Institut Trudy, No 100, L. B. Byshovets, editor, Moscow, 1971. 176 p.

Descriptors: *Streamflow, *Runoff, *Discharge (Water), *Floods, Flood data, Flood waves, Flood flow, Rainfall-runoff relationships, Surface-groundwater relationships, Overland flow, Snowmelt, Hydrographs, Routing, Streamflow forecasting, Reservoirs, Water storage, Water balance, Water yield, Watershed management, Erosion control.
Identifiers: European USSR, *Ukraine, *Moldavia, Carpathian Mountains, Dnieper River, Dniester River, Storm precipitation, Traveltime, Nomograms.

Information is provided on formation and regulation of spring and storm runoff on rivers in the Ukraine and Moldavia. Procedures used to compute flood-wave movement in Dnieper River reservoirs are described in connection with the 75-year flood which occurred on the Lower Dnieper between Kiev and Kakhovka in the spring of 1970. Flood data obtained from catastrophic floods in the Dniester, Prut, Seret, and Tisza River basins in the Ukrainian Carpathians in June 1969 and May 1970 are analyzed to define and interpret flood profiles. Storm-precipitation patterns in irrigated regions of southern European Russia are examined, and methods are presented for performing snowmelt and spring-runoff computations and for preparing a short-term forecast of daily water discharges of the Dnieper River at Kiev. (See W74-00593 thru W74-00601) (Josefson-USGS)
W74-00592

PROCEDURES FOR COMPUTING MOVEMENT OF SPRING FLOW ALONG THE CASCADE OF RESERVOIRS ON THE DNIEPER RIVER (METODIKA RASCHETA DVIZHENIYA VESENNEGO STOKA PO KASKADU VODOKHRANILISHCH NA DNEPRE),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
I. A. Zheleznyak, L. B. Byshovets, and I. A. Tkachenko.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 3-22, Moscow, 1971. 5 fig, 5 tab, 8 ref.

Descriptors: *Flood flow, *Flood waves, *Flood routing, *Flood discharge, *Reservoirs, Flood stages, Stage-discharge relations, Channels, Hydrographs, Water storage, Reservoir storage, Inflow, Water balance, Gaging stations, Computer programs, Curves, Equations.
Identifiers: USSR, *Dnieper River.

Procedures for calculating flood-wave movement along the cascade of reservoirs on the Dnieper River were based on methods of flood routing in individual river reaches and large reservoirs. Flood routing in a river involves solutions of water-balance equations for reaches in which average time of water movement approximates duration of the design time interval (day), with allowance made for change in channel storage. Flood routing in a large reservoir is reduced to a determination of its daily water balance with consideration for change in dynamic capacity depending on outflow stage and discharge. Computation of the movement of a flood wave from inlet gaging stations of the Dnieper Cascade (Mozyr' on the Pripyat', Rechitsa on the Dnieper, Gomel' on the Sozh) to Kakhovka includes calculations of the transformation of average daily water discharges in 16 river reaches and 5 reservoirs, performed with allowance for lateral inflow and reservoir operation during a flood period. A program was prepared for the EVM M-220 computer according to procedures proposed; calculations were made of flood wave movement in 1965-69; and estimates are given of the reliability of results. (See also W74-00592) (Josefson-USGS)
W74-00593

EXPERIMENT IN CALCULATING MOVEMENT OF THE 1970 FLOOD WAVE ALONG THE CASCADE OF DNIPER RESERVOIRS (OPYT RASCHETA DVIZHENIYA VOLNY POLOVOD'YA 1970 G. PO KASKADU DNEPROVSKIKH VODOKHRANILISHCH),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02E.
W74-00594

SHORT-TERM FORECAST OF DAILY DISCHARGES OF THE DNIEPER RIVER AT KIEV DURING THE PERIOD OF THE 1970 FLOOD (O KRATKOSROCHNOM PROGNOZE

YEZHEDNEVNYKH RASKHODOV DNEPRA U KIYEVA V PERIOD POLOVOD'YA 1970 G.),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
Ye. I. Kochelaba.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 31-41, Moscow, 1971. 3 fig, 3 tab, 8 ref.

Descriptors: *Streamflow forecasting, *River forecasting, Flood forecasting, Floods, *Discharge (Water), Peak discharge, Stage-discharge relations, Routing, Hydrographs, Inflow, Reservoirs, Watersheds (Basins), Gaging stations, Equations.
Identifiers: USSR, *Dnieper River, *Kiev, Travel-time.

Conditions of formation of peak discharge of the Dnieper River at Kiev and the role of individual basins are analyzed. An accurate forecast of peak discharge at this station can be prepared on the basis of a short-term forecast of daily discharges. A short-term forecast of daily discharges of the river at Kiev during the period of the 1970 flood is based on stage-discharge relations at the inlet gaging station of each design reach. (See also W74-00592) (Josefson-USGS)
W74-00595

PROBLEM OF SIMPLIFYING SNOWMELT COMPUTATIONS (K VOPROSU OB UPROSHCHENNOM RASCHETE SNEGOTAYANIYA),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02C.
W74-00596

CALCULATION OF SPRING RUNOFF DEPTH IN CARPATHIAN RIVERS (RASCHET SLOYA VESENNEGO STOKA REK KARPAT),
Ukraniskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
A. V. Shcherbak.
In: Formirovaniye, raschety i regulirovaniye rechnogo stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 100, p 69-74, Moscow, 1971. 1 fig, 1 tab, 7 ref.

Descriptors: *Runoff, *Spring, *Rivers, Tributaries, Watersheds (Basins), Hyposometric analysis, Precipitation (Atmospheric), Snowmelt, Water equivalent, Antecedent moisture content, Freezing, Curves, Equations.
Identifiers: USSR, *Carpathian Mountains, *Dniester River.

The relation of average depth of total spring runoff on Carpathian tributaries of the Dniester River to average basin elevation is local in character. Spring runoff on Carpathian rivers is determined mainly by snow storage and liquid precipitation occurring during the period of runoff formation. The negligible effect of antecedent moisture content and soil freezing on spring runoff during the period examined (1947-67) is attributable to their small variability from year to year. (See also W74-00592) (Josefson-USGS)
W74-00597

FLASH FLOODS ON CARPATHIAN RIVERS IN JUNE 1969 AND MAY 1970 (LIVNEVYYE PAVODKI NA REKAKH KARPAT V IYUNE 1969, MAYE 1970 G.),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02E.
W74-00598

FACTORS RESPONSIBLE FOR FLOODFLOW IN CARPATHIAN RIVERS (AS ILLUSTRATED BY THE STRYY AND BYSTRITSA RIVERS) (FAKTORY PAVODOCHNOGO STOKA KARPATSKIKH REK (NA PRIMERS STRYYA I BYSTRITSY)),
Ukrainskii Nauchno-Issledovatelskii Gidgrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02E.
W74-00599

COMPUTATION OF MAXIMUM STORM RUNOFF FOR DESIGNING EROSION CONTROL STRUCTURES IN SOUTHWESTERN EUROPEAN RUSSIA (RASHET MAKSIMAL'NOGO LIVNEVOGO STOKA PRI PROYEKTIROVANII PROTIVOEROZIONNYKH SOORUZHENIY V YUGO-ZAPADNOY CHASTI YETS),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02D.
W74-00600

SURFACE-GROUNDWATER RELATIONSHIPS ON THE EASTERN DNIESTER LEFT BANK (O VZAIMOSVYAZI POVERKHNOSTNYKH I PODZEMNYKH VOD NA VOSTOKE LEVOBEREZHNOGO PODNESTROV'YA),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02A.
W74-00601

ALGORITHM FOR SOLVING A CLASS OF LINEAR PROGRAMMING PROBLEMS RELATED TO RESERVOIR MANAGEMENT AND DESIGN,
Universidad Nacional del Sur, Bahia Blanca (Argentina).
R. Alemany, P. Fernandez, and A. G. De Pousa.
Water Resources Research, Vol 9, No 5, p 1227-1234, October 1973. 6 tab, 4 ref.

Descriptors: *Linear programming, *Algorithms, *Reservoirs, *Management, *Design, Decision making, Equations, Mathematical models, Systems analysis.
Identifiers: *Argentina (El Chocon Reservoir), Argentina (Limay River).

Detailed description is given of an algorithm for easily solving (by hand computation) a class of linear programming problems related to the use of the 'linear decision rule' in reservoir design and management. The method clarifies some theoretical aspects of the practical problem. For purposes of illustration, the algorithm is applied to the El Chocon Reservoir in southwestern Argentina. There has been interest in developing a quick and flexible method of calculation for discussing management alternatives for this reservoir, which has a planned capacity of 20,170 hm and contemplates both a power output of 1,2000,000 kw and an irrigated capacity for 625,000 ha. (Bell-Cornell)
W74-00667

OPTIMIZATION MODEL FOR THE OPERATION OF FLOOD CONTROL SYSTEMS,
Natal Univ., Durban (South Africa). Dept. of Civil Engineering.
J. S. Windsor.
Water Resources Research, Vol 9, No 5, p 1219-1226, October 1973. 4 fig, 10 ref.

Descriptors: *Reservoir operation, *Flood control, *Linear programming, *Optimization, Reservoir storage, Reservoir releases, Costs, Flood damage, Downstream, Evaluation, Forecasting, Stochastic processes, Methodology, Mathematical models, Systems analysis.
Identifiers: *Cost minimization, Hydrometeorological conditions.

Recursive linear programming is used to determine the optimal operation of a system of flood control reservoirs. The system is operated over a number of discrete time periods, and the optimization model is used to determine the operating policy that minimizes the downstream damage costs associated with the magnitude of reservoir releases. The method recognizes component interaction in space and time. By dividing the flood period into shorter operational periods it is shown how the system policies may be adjusted to incorporate the latest forecast information and thus ensure maximum flexibility under actual operating conditions; using a series of sequentially-related linear programming routines to cover the entire flood period, the inputs to the model are adjusted at each time stage to reflect the changing storage and hydrometeorological conditions. It is assumed that decisions regarding the number, location, and size of the individual reservoirs in the system have previously been made. (Bell-Cornell)
W74-00668

CAPACITY DECISIONS IN A MULTIPURPOSE MULTIRESERVOIR SYSTEM,
Montana State Univ., Bozeman. Dept. of Industrial and Management Engineering.
S. Nayak, and S. R. Arora.
Water Resources Research, Vol 9, No 5, p 1166-1177, October 1973. 6 fig, 4 tab, 17 ref.

Descriptors: Water resources, *Alternative planning, *Multiple-purpose reservoirs, *Reservoir capacity, *Sites, *Linear programming, Optimization, Water demand, Flood damage, Water shortage, Costs, Reservoir construction, Decision making, River basins, Benefits, Economies of scale, Equations, Mathematical models, Systems analysis, Mississippi River.
Identifiers: *Cost minimization, *Nonlinear programming, Separable programming, *Minnesota River basin.

Optimization techniques are proposed for selecting the best sites for construction of a system of multi-purpose reservoirs that will most economically meet the various water demands. The objective function minimizes the sum of the annual amortized cost of the reservoirs and the annual flood shortage losses less the annual recreational benefits. The problem is formulated using nonlinear programming and has the advantage of being separable into variables, both in the objective function and in the constraints. It is finally reduced to a linear programming problem by substituting the nonlinear relationships with piecewise linear approximations. Employed is the common approximate approach to the problem, which chooses the optimal design parameters on the basis of straight historical inflow data for a specified period. The optimization considers the flood inflows (based on a given flood frequency) and the drought inflows (based on the severest drought on record) simultaneously. Releases are constrained only by the availability of water, and their optimal values are determined by balancing damages downstream against the cost of providing storage to prevent them. The model is applied to U.S. Army Corps of Engineers data for the Minnesota River basin, and the results are compared with the plan proposed by the Corps. (Bell-Cornell)
W74-00672

DETERMINATION OF THE DISCHARGE POLICY FOR EXISTING RESERVOIR NETWORKS UNDER DIFFERING OBJECTIVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
G. Le Clerc, and D. H. Marks.
Water Resources Research, Vol 9, No 5, p 1155-1165, October 1973. 3 fig, 4 tab, 3 ref.

Descriptors: *Multiple-purpose reservoirs, Networks, *Linear programming, *Reservoir

releases, Discharge (Water), *Drawdown, Management, Optimization, Costs, Design, Systems analysis, Economics, Recreation, Water supply, Streamflow, Rivers, Constraints, Mathematical models, Reservoir capacity.
Identifiers: *Discharge policy, *Operating policy, *Riviere du Nord (Quebec-Canada), Chance-constrained programming, Screening, Cost minimization.

For existing reservoirs an efficient policy implies maximization of the magnitude of the streamflow guaranteed at a given reliability level. Using a linear programming screening model, the discharge policy for a network of eight small existing reservoirs utilized for recreational activities and for water supply of a city downstream of the network is determined. The optimization problem is formulated by employing a linear operating rule, and chance-constrained programming is adopted to account for the stochasticity of the inflows. Two objective functions are introduced to study the cost of a more 'equitable' distribution of the losses due to surface drawdowns versus the most 'efficient,' which minimizes the total summation of the individual drawdowns; comparison of the solutions leads to quantification of the additional cost that society has to pay for a discharge policy that is equitable rather than efficient. A case study on the Riviere du Nord, Quebec, Canada is presented. Results show that the linear operating rule is valid for existing reservoir analysis; observed also is that chance-constrained programming may have serious ineptitudes for design purposes and for analysis of large existing reservoir networks. The approach, however, is a desirable management tool for systems of small reservoirs, primarily as a screening model. (Bell-Cornell)
W74-00673

FLOW AND CHANNEL CHARACTERISTICS OF TWO HIGH MOUNTAIN STREAMS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
B. H. Heede.
USDA Forest Service, Research Paper RM-96, October 1972. 12 p, 9 fig, 5 tab, 11 ref.

Descriptors: Hydraulics, *Open channels, *Channel morphology, *Channel flow, Hydraulic properties, *Slope stability, *Discharge (Water), Regime, Reynolds number, Froude number, Turbulent flow, Transition flow, Colorado.
Identifiers: *Mountain streams, *Hydraulic geometry, Step formation, Bed material movement, Floodplain forest management, Channel shape, Sediment movement.

Steps provided by logs fallen across the channel added to flow energy reduction. The streams required an additional number of gravel bars to adjust to slope. Average step length between logs and gravel bars are strongly related to channel gradient and median bed material size. More bars formed when fewer numbers of logs were available. Although these are 'rushing mountain streams,' most values for flow velocities ranged between 0.5 and 2.5 feet per second. Exponents of functions expressing rate of change of depth or velocity, respectively, with discharge, indicated that dynamic stream equilibrium was attained. Implications for forest management are that sanitation cuttings (removal of dead and dying trees) would not be permissible where dynamic stream equilibrium exists and bed material movement should be minimized. (Forest Service)
W74-00678

EFFECT OF SNOW FENCE HEIGHT ON WIND SPEED,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00691

PRELIMINARY RESULTS OF WATER LEVEL CONTROL ON SMALL PLOTS IN A PEAT BOG,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
D. H. Boelter.
In: Proceedings Fourth International Peat Congress, Helsinki, Finland, June 25-30, 1972. I-IV, p 347-354. 3 fig, 6 ref.

Descriptors: *Organic soils, *Controlled drainage, *Evapotranspiration, *Subsidence, Microclimatology, Wetlands, Peat, Bogs, Water table, Hydrologic properties, *Minnesota, Watershed management, Demonstration watersheds.
Identifiers: *Water level control, Wetland hydrology, Peatlands, Bog vegetation, *Peat bogs.

Bottomless metal tanks driven into the organic soil were used to study the effect of water level control in a peat bog. Water levels were maintained at depths of 0.0 m., 0.3 m., and 0.6 m. The two lower water levels resulted in subsidence of 3.5 to 6.0 cm. in 2 1/2 years, due primarily to settling of the undecomposed surface peat material as water was drained from it. By contrast, the surface elevation in high water level plots rose 6.0 to 9.0 cm. due to the rapid growth of sphagnum moss. Sedges and cotton grass became more dominant in high water level plots. Labrador tea became the most prominent vegetation in the low water level plots and spagnum moss dried up. Evapotranspiration in the low water level plots was estimated to be less than half of that in the high water level plots. The lower evapotranspiration is attributed primarily to the reduced evaporation by sphagnum mosses. (Forest Service)
W74-00694

VEGETATION CHANGES AS A RESULT OF SOIL RIPPING ON THE RIO PUERCO IN NEW MEXICO,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
E. F. Aldon, and G. Garcia.
Journal of Range Management, Vol 25, p 381-383. September 1972, 1 fig, 1 tab, 6 ref.

Descriptors: *Soil treatment, *Soil moisture, *Forage grasses, Runoff, Flood plains, Forage palatability, Precipitation, *New Mexico, Demonstration watersheds, *Ranges.
Identifiers: *San Luis watershed (N Mex), *Soil ripping, Ground cover, Grazing management, Perennial grasses.

Soil ripping in 1963 effectively reduced runoff on the San Luis watershed of the Rio Puerco, New Mexico, and caused a favorable shift in forage production from galleta to alkali sacaton. Ripping effects on runoff are short-lived, but forage production patterns may persist for 10 years. (Forest Service)
W74-00696

DEVELOPMENT OF A SELECTIVE ALGAECIDE TO CONTROL NUISANCE ALGAL GROWTH,
Dow Chemical Co., Freeport, Tex. Texas Div.
For primary bibliographic entry see Field 05G.
W74-00702

MALEZAS ACUATICAS, AQUATIC WEEDS, J. M. BRISTOW,
Colombian Agricultural Inst., Bogota.
J. M. Bristow, J. Cardinas, T. M. Fullerton, and J. Sierra.
1971. 116 P. 55 PHOTOS, 24 REF.

Descriptors: *South America, *Systematics, *Aquatic weeds, Floating plants, Submerged plants, Rooted aquatic plants, Habitats, Climatic zones, Aquatic plants.
Identifiers: *Colombia (South America), Plant propagation, Dissemination, Emergent plants.

The serious economic problem of aquatic weeds in Colombia, South America, becomes more acute with construction of new irrigation systems and reservoirs. With increasing contamination of canal waters by run-off of agricultural fertilizers and sewage, the problem is likely to become worse. In order to formulate suitable measures for the chemical control of these weeds, it is essential to know the species or at least the genera. Pictured in color are 55 common species which permit easy visual identification. The classification and a simple description of each species is given, together with their habitats, the climate in which each is found, and their modes of propagation. Dispersion may be by water or by birds. Mna has been responsible for the world dissemination of some of the most noxious aquatic weeds such as Eichhornia, Salvinia, Elodea, Hydrilla, and Alternanthera. (Jones-Wisconsin)
W74-00736

SHORELINE MANAGEMENT INVENTORY.
Renton Planning Dep., Wash.

October, 1972. 52 p, 10 fig, 15 tab, 4 append.

Descriptors: *Shores, *Washington, Shore protection, Lake shores, Planning, Land use, Land tenure.
Identifiers: *Shoreline management, Environmental inventory, *Seattle (Wash), Lake Washington.

An inventory is presented of natural characteristics of shorelines in the Seattle suburb of Renton, as required by the State of Washington's Shoreline Management Act of 1971. Portions of shoreline on Lake Washington, Cedar River, Green River, Black River, Springbrook Creek, and May Creek in the inventory extend to an area at least 500 feet from ordinary high water marks of these shorelines. Items noted include existing land and water uses, generalized land ownership patterns, river and lakeshore classifications, mineral resources, water level fluctuation, characteristic animals, soil types and capabilities, characteristic vegetation, and almost 6.5 miles of shore defense works. Shore-related plans and programs are summarized; public plans include construction of a channel to minimize flood damage in an industrial area, relocation and widening of a creek, a link in a Cedar River Trail System, a regional park along May Creek, improvement of a lakefront airport, and expansion of Lake Washington Beach Park. There are private plans for a commercial-recreational development on 60 lakefront acres. Proposed capital improvements for 1973-1978 are mapped. (Stein-North Carolina)
W74-00741

POLICY PLAN FOR DEVELOPMENT OF LANSING'S WATERFRONT.
Waterfront Development Board, Lansing, Mich.
For primary bibliographic entry see Field 03D.
W74-00742

A REPORT UPON WEST CENTRAL MARICOPA COUNTY, ARIZONA: VOLUME I, A STUDY OF PHYSICAL ENVIRONMENTAL FACTORS AS A BASIS FOR LAND USE PLANNING.
Maricopa County Planning and Zoning Dept., Phoenix, Ariz.
For primary bibliographic entry see Field 03D.
W74-00746

HONOLULU BOARD OF WATER SUPPLY ANNUAL REPORT FOR THE YEAR ENDED JUNE 30, 1972.
Honolulu Board of Water Supply, Hawaii.
For primary bibliographic entry see Field 06B.
W74-00749

LAMAR COUNTY: LAND USE SURVEY AND ANALYSIS, LAND USE PLAN, HOUSING, WATER AND SEWER, OPEN SPACE.
West Alabama Planning and Development Council, Tuscaloosa.
For primary bibliographic entry see Field 05D.
W74-00750

CORONADO RESOURCE CONSERVATION AND DEVELOPMENT PROJECT, PROGRAM OF ACTION.
Soil Conservation Service, Phoenix, Ariz.

May 1973. 133 p, 7 map, 13 tab, charts.

Descriptors: Natural resources, *Conservation, *Water resources, *Land use, *Project planning, Governmental interrelations, *Arizona, Recreation, Wildlife, Irrigation, Surveys, Resources development.

The project area is bounded by Mexico on the south and New Mexico on the east. It has a land area of nearly 9 million acres, of which 27 percent is privately owned, 38 percent federally administered, 24 percent state owned, and 11 percent Indian reservations, all lying within four counties. Of a total population of nearly 100,000, over 42 percent live in rural areas, with only two communities of more than 10,000 persons. The Program of Action presented is an effort to outline problems, opportunities and actions that will be taken to conserve, improve, and develop the resources of this 4-county project area. Surface water is scarce because of generally low rainfall, and irrigation water for the 230,000 acres in irrigated farmland comes from pumped deep wells. Because of a falling water table, project measures are proposed to achieve more efficient use of irrigation water by improving delivery systems and accelerating technical assistance for water management. The socio-economic, natural, agricultural, and recreation resources of the area are detailed, including climate, geology, minerals, ground and surface water, watershed, and soils, along with cropland and major plant communities. Supporting maps and tables show land ownership, annual precipitation, irrigated and urban lands, wildlife habitats, and watershed inventories. A short term plan for fiscal 1974 is appended. (Paylore Arizona)
W74-00755

SOME ASPECTS OF WEED CONTROL IN VINEYARDS, (IN ITALIAN),
For primary bibliographic entry see Field 05G.
W74-00767

FLOOD STUDIES FOR SAFETY OF TVA NUCLEAR PLANTS: HYDROLOGIC AND EMBANKMENT BREACHING ANALYSIS,
Tennessee Valley Authority, Knoxville.
For primary bibliographic entry see Field 08A.
W74-00805

NUMERICAL SIMULATION OF UNSTEADY FLOWS IN RIVERS AND RESERVOIRS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-00816

FLOOD MANAGEMENT PLAN--WARNING, DAMAGE, COORDINATION.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 06F.
W74-00817

HEC-1, FLOOD HYDROGRAPH PACKAGE--USERS MANUAL, COMPUTER PROGRAM 723-X6-L2010.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-00821

COMPUTER PROGRAM 723-X6-L202A, HEC-2, WATER SURFACE PROFILES--USERS MANUAL.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-00822

COMPUTER PROGRAM 723-X6-L202A, HEC-2, WATER SURFACE PROFILES--PROGRAMMERS MANUAL.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-00823

WATER RESOURCES DATA FOR NEW YORK, 1972: PART 1. SURFACE WATER RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 07C.
W74-00825

THE TIDAL POWER POTENTIAL OF UNGAVA BAY AND ITS POSSIBLE EXPLOITATION IN CONJUNCTION WITH THE LOCAL HYDROELECTRIC RESOURCES,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
G. Godin.
Manuscript Report Series No 30, 1973. 78 p, 20 fig, 7 tab, 11 ref.

Descriptors: *Water resources development, *Tidal waters, *Canada, *Hydroelectric power, Projections, Water yield, Tidal effects, Tidal powerplants, Planning, Tidal energy, Electric power production.
Identifiers: *Ungava Bay (Canada).

The principles underlying the exploitation of tidal energy and estimated power potential of the bays and estuaries on the periphery of Ungava Bay, Canada, as well as the hydro potential of the rivers of the Ungava hinterland are reviewed. The Payne, the Leaf, the Koksoak-Larch-Kaniapiskau system, the Whale and the George Rivers all have their sources in the interior highlands and drop from heights ranging from 220 to 740 m above sea level. The Koksoak has a mean discharge of 2,420 cubic meters/sec. Together, they have a power potential of 12,000 MW. The tidal range (water level change) at the entrance of the Koksoak River in Ungava Bay may reach 12.6 m, while inside Leaf Basin a little further to the northwest, it may get as high as 13.4 m. The range at Saint John, N.B., half-way up the Bay of Fundy is about 10 m. Considering that the volume of water contained in Ungava Bay is five times as large as in the Bay of Fundy, much more tidal energy is present in Ungava Bay. (Woodard-USGS)
W74-00838

SOME IMPORTANT PROBLEMS IN MODERN LIMNOLOGY (O NEKOTORYKH VAZHNYKH ZADACHAKH SOVREMENNOGO OZEROVEDENIYA),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
For primary bibliographic entry see Field 02H.
W74-00839

VARIABILITY OF ANNUAL RUNOFF AND PRECIPITATION VALUES (OB IZMENCHIVOSTI GODOVYKH VELICHIN STOKA I OSADKOV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
I. S. Zhdanova, L. V. Ivanova, and D. Ya. Ratkovich.
Vodnyye Resursy, No 1, p 95-105, 1973. 4 fig, 6 tab, 10 ref.

Descriptors: *Rainfall-runoff relationships, *Annual, *Variability, *Statistical methods, Runoff coefficient, Probability, Curves, Equations.
Identifiers: *Kazakhstan (USSR), Skewness.

Investigation of variability of annual runoff and annual precipitation was based on extensive field observation data. The coefficient of variation of precipitation is very stable and generally varies between 0.2 and 0.3; the coefficient of skewness is assumed to equal 1.5. Variability of annual runoff is higher than variability of precipitation; the ratio of these values increases with the increase in the index of dryness. The coefficient of skewness ranges from 1.5 to low runoff variability to 2 at high runoff variability. Proposals to normalize the coefficient of skewness of annual river runoff in Kazakhstan at 2.5 lack sufficient validity. (Josefson-USGS)
W74-00844

CONSIDERATION OF THE CHARACTER OF SURFACE-GROUNDWATER RELATIONSHIPS AND STREAMFLOW IN ESTIMATES OF YIELDS FROM INFILTRATION GALLERIES (UCHET KHARAKTERA SVYAZI PODZEMNYKH VOD S POVERKHNOSTNYMI I REZHIMA RECHNOGO STOKA PRI RASCHETAKH INF IL'TRATSIONNYKH VODOZABOROV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 08A.
W74-00848

INCREASING PROTECTION FOR OUR WATERS, WETLANDS, AND SHORELINES: THE CORPS OF ENGINEERS.
For primary bibliographic entry see Field 06E.
W74-00858

PRICKETT CREEK WATERSHED, WEST VIRGINIA (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as EIS-WV-73-0298-F, $4.25 in paper copy, $1.45 in microfiche. February 1973. 37 p, 1 map, 1 append.

Descriptors: *West Virginia, *Environmental effects, *Flood control, Watershed development, Comprehensive planning, Land use, Channel improvements, Flood prevention, Erosion, Recreation, Flood plain management, Water quantity control, Levees, Sediment control, Floodproofing.
Identifiers: *National Environmental Policy Act, *Environmental Impact Statements.

The Prickett Creek Watershed Project in West Virginia is to be carried out by sponsoring local organizations with federal assistance under the provisions of Public Law 566. The project will consist of conservation land treatment measures, one single-purpose floodwater retarding structure, and 7,030 feet of channel work to include levees, floodwalls and stream channel work. Planned measures will provide flood and sediment protection primarily to residences and industrial properties and transportation facilities in the Prickett Creek Watershed. Probable favorable effects of the project will be flood and sediment protection for improvements in the watershed and downstrem areas of the Monongahela and Ohio Rivers, stabilization of critically eroding areas, provision for a year-round fishery for public use, and the creation of job opportunities. Adverse effects expected include temporary increase of turbidity and sedimentation of stream water and decreased protective vegetation. Alternatives considered were flood proofing, flood plain management, flood insurance, land treatment measures only, and simply leaving the creek as it is. (Mockler-Florida)
W74-00860

PROJECTS PROPOSED FOR INCLUSION IN OMNIBUS RIVER AND HARBOR AND FLOOD CONTROL LEGISLATION--1972.
For primary bibliographic entry see Field 06E.
W74-00872

LEVEE UNIT NO. L-246, MISSOURI RIVER LEVEE SYSTEM (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Kansas City, Mo.

Available from the National Technical Information Service as EIS-MO-73-0099-F $4.50 in paper copy, $1.45 in microfiche. January 18, 1973. 40 p, 2 map.

Descriptors: *Missouri, *Levees, *Environmental effects, *Missouri River, Dams, Flood control, Flood prevention, Drainage, Water quality control, Agriculture, Rivers, Habitats, Channel improvement, Sediment load.
Identifiers: *National Environmental Policy Act, *Environmental Impact Statements, *Chariton County, Mo.

The proposed project would consist of the construction of a flood control project composed of a system of levees, interior drainage structures, and channel relocations and modifications. It would provide flood protection, modify and relocate a creek, increase sediment load into a lake, and preserve the recreational potential of a lake. The modification of five miles of the creek would change the natural character of the channel, associated stream biota, and the adjacent wildlife habitat; the recreation potential of this natural creek would be reduced. Moreover, the levee construction would destroy grass, forbs, timber, and other wildlife habitat. Alternatives to the proposed project include no action at all, diversion of the creeks involved, additional channel and levee construction, and a lower height of main stem levees. The total area to be protected by the proposed levee system amounts to 19,000 acres of which 14,700 are agricultural. The major crops raised are corn, wheat, and soybeans. The conclusion reached is that the adverse effects are ameliorated or outweighed by the potential favorable effects so that the project should be implemented. (Mockler-Florida)
W74-00879

GILLHAM LAKE, COSSATOT RIVER ARKANSAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.

Available from National Technical Information Service, U.S. Dep't. of Commerce as PB-202 134-F-2, $3.00 paper copy; $1.45 microfiche. August 31, 1971. 285 p.

Descriptors: *Arkansas, *Environmental effects, *Reservoirs, *River basin development, Dams, Water quality standards, Aesthetics, Planning, Water supply, Water pollution control, Aquatic environment, Recreation facilities, Flood protection, Watershed management.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act, *Gillham Lake, Ark.

The Gillham Dam and Reservoir was authorized for construction in 1959 for purposes of flood control, water supply, water quality control, and fish and wildlife preservation. At full pool, 13.5 miles of the Coassatot River would be inundated, forming a 4,680-acre lake. Normal lake levels or conservation pool levels will create a 1,370-acre lake, inundating 7.5 miles of the Cossatot River. Since recreational development along the Cossatot River is nonexistent, this project would serve as the site of extensive recreational projects. Environmental degradation would be minor with recreation developments occupying minimal space and constructed in a manner compatible with the environment. On the other hand, preserving the Cossatot River as a scenic and recreation river would result in few, if any, benefits, although there will be a loss in that the project will irretrievably and irrevocably commit the area to use as a reservoir. (See also W73-15137 and W74-00882) (Mockler-Florida)
W74-00881

GILLHAM LAKE, COSSATOT RIVER, ARKANSAS, APPENDIX II (PHOTOGRAPHS), APPENDIX III (ENVIRONMENTAL ELEMENTS), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.

Available from National Technical Information Service, U.S. Department of Commerce as PB-202 134 F-3, $3.00 paper copy, $1.45 microfiche. January 10, 1972. 138 p, 9 map, 58 photo, 38 tab.

Descriptors: *Arkansas, *Environmental effects, *Reservoirs, Dams, Planning, Water quality standards, Wildlife habitat, Aquatic environment, River basin development, Flood control, Water pollution control, Recreation facilities.
Identifiers: *Environmental impact statement; *National Environmental Policy Act; *Gillham Lake area, Howard and Polk Counties, Ark.

The environmental impact of the Gillham Dam is discussed with reference to the geologic factors. There are no known mineral resources in the Gillham project area. The most important adverse effect of the Gillham project on the mineral resources is the reduced natural replenishment of commercial sand and gravel deposits on the lower Cossatot River. In addition, the building of Gillham Dam will cause a loss of the river bottom site hardwoods, but not a complete loss of those on the bottomland. To a certain extent many of the bottomland hardwoods will return to the lake shore after an interim period. Fish currently occupying the headwaters of the Cossatot are expected to continue to maintain healthy populations upstream from the lake. The impoundment of Gillham Lake is not expected to create a serious mosquito breeding problem because of the steep, mountainous topography and the absence after impoundment of large, flat shallow water areas which would be conducive to establishment of aquatic vegetation. The ultimate project operation will also provide 28 c.f.s. average annual releases for downstream water quality requirements through a 50-year drought. (See also W74-00881) (Mockler-Florida)
W74-00882

SCIENTIFIC ALLOCATION OF WATER RESOURCES, WATER RESOURCES DEVELOPMENT AND UTILIZATION - A RATIONAL APPROACH,
Technion - Israel Inst. of Tech., Haifa. Lowdermilk Faculty of Agricultural Engineering.
For primary bibliographic entry see Field 06A.
W74-00885

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME I.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00888

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME II.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00889

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME I.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00890

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX D--MAP FOLIO.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00924

SYSTEMS ENGINEERING APPROACH,
Texas Water Development Board, Austin. Systems Engineering Div.
For primary bibliographic entry see Field 06A.
W74-00940

MOISTURE BALANCE IN THE OAK FORESTS ON THE NORTHERN DONETS RIGHT BANK, (IN RUSSIAN),
A. I. Mikhovich.
Lesovod Agrolesomelior Resp Mezhved Temat Nauchn Sb. 20. p 103-112. 1970.
Identifiers: Forests, Interception, *Moisture balance, *Oak forests, Precipitation, Runoff, Transpiration, *USSR (Donets River), River banks.

The results are given of 10-yr stationary hydrological investigations in various types of oak stands of the Mayaki Forest of the Slavyansk Forest Lumbering Farm in the Donetsk region, as well as brief characterization of weather conditions during each year. The interception of precipitation by tree crowns in dry (D1) and mesic (D2) oak stands, as well as soil freezing, snow accumulation and the duration of snow melt, surface runoff, total evaporation under the forest canopy, accumulation and expeniture of moisture in 3 m thick soil-ground layers, moisture balance during the growing season according to years dynamics of soil humidity, depth of wetting, the drying of the ground soils and water expenditure for plant transpiration were all studied. The immense water-regulating and soil protective role of the oak forests on the slopes is indicated. The almost complete absence of the summer storm runoff in oak forests and the reduction to a minimum of the annual surface runoff (the coefficient of the annual surface runoff varies in dry oak forests according to years from 0.000-0.033, and from 0.000-0.072 in fresh oak forests) prevent the washing out of soil from the bank slopes, and the silting of the bed of the Northern Donets River.--Copyright 1973, Biological Abstracts, Inc.
W74-00983

COURSE OF PHYTOCENOSIS FORMATION IN CLOSED SHALLOWS OF FLOOD BAND OF THE KIEV HYDROELECTRIC STATION RESERVOIR, (IN UKRAINIAN),
L. S. Balashov.
UKR Bot Zh. Vol 29, No 2, p: 191-195. 1972. (English summary).
Identifiers: Bogs, Flood bands, Fodder, Forests, Hydro electric plants, *Phytocenosis formation, Reservoirs, *USSR (Kiev reservoir), Waterfowl nesting.

The character of developing basin overgrowth is considered in the flood band of the Kiev (USSR) reservoir forests and bogs as well as in the temporal basins. The rather slow process of growing is observed: for 5 yr, only duckweed is distributed everywhere in the closed basins and other higher aquatic plants are met rarely. Some basins are typically oligotrophic. Their total area in the forests region is 1500 ha. It would be expedient to make the most efficient use of these basins for nesting of waterfowl which necessitates enriching the flora with valuable food plants.--Copyright 1973, Biological Abstracts, Inc.

W74-01011

EFFECT ON FLOOD INTRODUCED PLANTS IN THE DESNA RIVER FLOOD PLAIN NEAR OSTRA, (IN UKRAINIAN),
A. I. Barbarych.
Ukr Bot Zh. Vol 29, No 4, p: 517-520. 1972, (English summary).
Identifiers: *Floods, Floodplain, Rivers, Temperature, *USSR (Desna River), Plant communities.

A list of plant species which died as a result of long flooding during the severe flood in 1970 in flood plain of the Desna river (USSR) (from 3 till 4 wk under a water layer to 2 m) as well as a list of species which endured it are presented. The negative effect of flood on the introduced plants intensifies if, besides the long period of flood, there is influence of water high temperature, as was observed during the flood in 1931.--Copyright 1973, Biological Abstracts, Inc.
W74-01013

CHANGES OF PLANT COMMUNITIES IN OVERGROWN BODIES OF WATER OF THE AMU-DARYA DELTA, (IN RUSSIAN),
For primary bibliographic entry see Field 02L.
W74-01018

PLANTATIONS OF CONIFEROUS TREE SPECIES, (IN RUSSIAN),
For primary bibliographic entry see Field 02I.
W74-01023

IN SEARCH OF NEW METHODS FOR RIVER SYSTEM PLANNING,
Harvard Univ., Cambridge, Mass. Graduate School of Public Administration.
A. Maass, and M. M. Hufschmidt.
Journal of the Boston Society of Civil Engineers, Vol 46, No 2, p. 99-117, April, 1959. 1 fig.

Descriptors: *Water resources development, Planning, *Methodology, *Mathematical studies, *Idaho, Simulation analysis, Mathematical models, Cost-benefit ratio, *River basin development.
Identifiers: *Maximizing-net benefits, *Planning techniques, *Clearwater River Basin (Idaho).

The research goal of the Harvard water resource planning and development program was to improve methodology for the planning and design of multi-unit, multi-purpose water resource systems. The objective of improved planning techniques was to approximate that unique combination of system units and purposes which will maximize net benefits. This is a point where (1) the marginal benefits are equal for the last dollar spent in producing each output and (2) marginal costs equal marginal benefits for each output and for the system as a whole, if there are no monetary or budgetary constraints--or if such constraints are effective, marginal costs for an increment of output are equal for all system units. The production function, the physical relation between inputs and outputs, is important. Based on data for Clearwater River Basin, Idaho, a prototype riber basin system, with 4 storage dams, 1 diversion dam, 2 power plants, and 1 system of irrigation distribution works, was developed representing three purposes--irrigation, power, and flood control. Techniques for determining the production function were: (1) 'working around the edges,' essentially the method than used for selecting, by engineering judgement and experience, a limited number of combinations for detailed investigation and analyzing these; (2) simple mathematical models, abstracting the problem so that most of the analysis could be handled by standard mathematical methods; and (3) simulation of the system on high-speed electronic digital computers under given assumptions regarding natural flow hydrology; levels of time patterns of outputs; sizes of reservoirs, power plants, canals and other system units; operating policy; and costs and benefit functions. (Edwards-North Carolina)
W74-01029

STORM DRAINAGE STUDY, (CHATHAM COUNTY-SAVANNAH, GEORGIA).
Chatham County-Savannah Metropolitan Planning Commission, Savannah, Ga.

July, 1972. 26 p, 4 maps. HUD-GA-04-00-0166.

Descriptors: *Flooding, *Drainage, *Drainage systems, *Storm runoff, Flood damage, Drainage programs, Canals, Culverts, Water quality, Tidal effects priorities, Costs, Land use, *Georgia.
Identifiers: *Savannah (Geo).

Storm water drainage is a significant problem in the Savannah metropolitan area as the topography is quite flat, tidal action often reduces the hydraulic gradient of the drainage canals, and vegetation and debris in the canals retard water flows. Numerous projects to improve storm water drainage, some policies with regard to the provision of drainage by subdivision developers, possible assistance programs through the U.S. Army Corps of Engineers, and the water quality aspect of storm runoff are discussed. The proposed projects, consisting mostly of new channels, tidal gates, pumping stations, and enlarged culverts, are presented of a drainage basin basis and then ranked in terms of importance. Cost estimates for the 2B ranked projects are also included. Much of the improvement program consists of enlarging and maintaining existing canals and culverts to relieve flooding conditions in existing urban areas rather than extending drainage facilities to newly urbanizing areas. (Elfers-North Carolina)
W74-01031

NORTH CAROLINA WATER PLAN-PROGRESS REPORT, CHAPTER 35-NEW RIVER BASIN.
For primary bibliographic entry see Field 06B.
W74-01033

MASTER PLAN FOR MAJOR DRAINAGE: HENRY'S LAKE AREA, SUBBASIN 1-31-55-01-01.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 06B.
W74-01037

A PROGRAM FOR STORM DRAINAGE AND FLOOD CONTROL-1971-1990: DAMAGE PREVENTION, MAJOR DRAINAGEWAYS, MASTER PLANNING, REGIONAL MANAGEMENT.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 06F.
W74-01038

ANALYSIS OF PORT DEVELOPMENT POTENTIALS AT GREAT SODUS BAY.
Genesee/Finger Lakes Regional Planning Board, Rochester, N.Y.
For primary bibliographic entry see Field 06B.
W74-01039

WATER SUPPLY AND SEWAGE FACILITIES PLAN UPDATE-1970.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 06B.
W74-01045

WATER-RELATED FACILITIES STUDY FOR THE COMPREHENSIVE REGIONAL PLAN OF COLUMBUS AND FRANKLIN COUNTY (OHIO).
Burgess and Niple, Ltd., Columbus, Ohio.
For primary bibliographic entry see Field 06B.
W74-01048

CLASSIFICATION AND EVALUATION OF FRESHWATER WETLANDS AS WILDLIFE HABITAT IN THE GLACIATED NORTHEAST,
Rhode Island Univ., Kingston. Dept. of Forest and Wildlife Management.
For primary bibliographic entry see Field 06B.
W74-01052

DESIGN OF SMALL DAMS.
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 08A.
W74-01058

FLOOD STUDIES,
Bureau of Reclamation, Denver, Colo. Flood Hydrology Section.
For primary bibliographic entry see Field 08A.
W74-01061

STUDY OF THE CONDITION AND GROWTH OF FOREST PLANTATIONS, (IN RUSSIAN),
G. S. Ivanov.
Sb Rab Po Lesn Khoz Mold Lesn Opytn Stn. 4, p 85-128, 1970.
Identifiers: *Black locust, Cutting, Forest plantations, Growth, *Oak, Plantations, *USSR (Gerbovetskii Forest).

Investigations conducted in the Gerbovetskii Forest (Moldavia) established that the main cause of the problems of oak and black locust plantations under dry conditions is the excessive density of the stands. The use of moisture-loving oak forms (from the floodplain, the lower parts of ravines) in dry habitats is an additional factor determining the problem of oak plantations. Crises occur when the oak is 15-20 yr old and the black locust-8-10 yr old. Well developed trees should be formed by improvement cuttings from an early age, establishing oak plantations in accordance with 2-story variants of the woody-shady type. A list is presented of 82 factors of scientific significance in the Gerbovetskii Forest for the purpose of studying the growth of stands with the participation of various tree species. The necessity of establishing plantations which are of optimum composition is based on the principles of the age-class theory as indicators of the degree of resistance. The principle of optimum improvement cuttings is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01071

AQUATIC VEGETATION OF FISHPONDS OF THE WESTERN REGIONS OF THE UKRAINE, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
R. L. Arenkova.
Rastit Resur. Vol 8, No 2, p 229-236, 1972. Illus.
Identifiers: *Aquatic vegetation, *Macrophytes, Ponds, *USSR (Ukraine), Fishponds, Water chemistry.

The fishponds of the western regions of the Ukraine are severely overgrown with macrophytic plants. Overgrowths occupied from 10-95% of the area in 141 of the 177 ponds investigated. The maximum density of overgrowth and the biomass of the macrophytic plants was noted between the end of June and the middle of July, and then decreased toward fall. The distribution of macrophytic plants was closely related with water chemistry and bottom deposits.--Copyright 1973, Biological Abstracts, Inc.
W74-01075

HEC-4, MONTHLY STREAMFLOW SIMULATION, COMPUTER PROGRAM 723-X6-L2340.
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 07C.
W74-01091

DEVELOPMENT OF A SNOWMELT-RUNOFF MODEL FOR THE U.S. TUNDRA BIOME, PROGRESS REPORT,
For primary bibliographic entry see Field 02C.
W74-01094

VEGETATION AND STRATIGRAPHY OF BOGS OF THE EASTERN FOREST-STEPPE, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Botaniki.
A. I. Kuz'mychov.
Ukr Bot Zh. Vol 29, No 1, p 42-48, 1972, Illus, (English summary).
Identifiers: Alder, *Bogs, Economics, Equisetum, Forest steppe, Reed, Rush, Sedge, Sphagnum, Steppe, *Stratigraphy, *USSR (Upland), *Vegetation, Willow.

Peat-bog region of the Eastern Forest-Steppe is located on the southwestern spurs of the Central USSR Upland. Boginess of this region is the least of all the forest-steppe regions in the Ukraine and accounts for about 0.5% of the territory. The bogs are backwater, confined to the flood plains of numerous small rivers. There are also ravine and sometimes Sphagnum eutrophic bogs in depressions on pine-forest terraces. Natural plant cover of bogs is presented by eutrophic groupings where the formations of European alder and grey willow predominate. The formations of herbaceous groupings, reed, Equisetum, rushy and some sedge species, are less distributed. Bog vegetation is strongly distrubed as a result of economic activity. The greatest part in peat structure is taken by alder-reed, swamp-forest, and multilayer-swamp types of peat deposits. Reed-alder/alder type of deposits is rate. In the peat deposits, the alder-reed and reed types of peat predominate which are distinguishable for their high ash content. In more than half the samples analyzed, ash control is above 40%. By the decomposition degree, the peats are average-to well-decomposed. The bogs of the eastern forest-steppe appeared as a result of bogging of flood plain alder forests and basins. The bogs of this region with respect to genesis, plant, cover, peat deposits properties and geomorphological types are close to those in the neighboring regions of the Central USSR Upland.--Copyright 1973, Biological Abstracts, Inc.
W74-01096

EFFECT OF DEPTH OF SOIL CULTIVATION AND OF FERTILIZERS ON THE SURVIVAL AND GROWTH OF PINE ON THE LOWER DNIEPER SANDS, (IN RUSSIAN),
T. T. Govorova.
Lesovod Agrolesomelior Resp Mezhved Temat Nauchn Sb. 20. p 96-102. 1970.
Identifiers: Fertilizers, Growth, Moisture, Peat, *Pine, Pinus-Nigra-Caramanica, Sands, *Soil cultivation, *USSR (Dnieper RIVER).

The effect of depth of soil cultivation and peat application as fertilizer on the survival and growth of Pinus nigra caramanica plantations on hillocky Lower Dnieper sands was studied over an 11-yr period. The plantations were established with holes of 50 x 50 cm, with 5 variants as regards depth of soil cultivation: 150, 100, 70, 50 and 30 cm, and with the application of peat and without it. Eight to 10 kg of peat per plot was put at the bottom of the holes in a 10-cm layer. Survival rate of pine in the year of planting (by May 15) in all the variants of the trial was quite high (93-100%); 74-88% in Oct. With the increase of the depth of loosening the rate of pine survival increased. Data are presented on the development of root systems and soil moisture in relation to the depth of soil cultivation. With equal soil cultivation, peat improves the growth and the general condition of plantings during the first 2-3 yr, later the differences in growth level out. The use of peat is a shortterm measure; it is dried out as early as within one growing season during the year of planting. The positive effect of the depth of soil preparation on pine growth is traced in the plantations up to the age of 11 yr.--Copyright 1973, Biological Abstracts, Inc.
W74-01098

MOISTURE EXPENDITURE BY FOREST AND FIELDS IN THE PROTECTIVE AFFORESTATION REGIONS, (IN RUSSIAN),
For primary bibliographic entry see Field 03F.
W74-01099

4B. Groundwater Management

PERMEABILITY RESTORATION IN UNDERGROUND DISPOSAL RESERVOIRS,
Alabama Univ., University. Natural Resources Center.
For primary bibliographic entry see Field 05E.
W74-00554

THE USE OF GROUNDWATER IN MINNESOTA,
Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
R. D. Harnack.
In: Proceedingsof Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 30-34, February 1973. 3 tab. 14-31-0001-3823.

Descriptors: *Water resources development, *Groundwater, *Minnesota, Water utilization, Irrigation water, Domestic water, Water supply, Water quality, Hydrologic data, Data collections.

The use of groundwater in Minnesota has increased during the past 5 years, especially in the areas of rural domestic use and irrigation. At present there is very little regulation as to the use of groundwater in Minnesota. In many parts of the State groundwater shortages are due to the lake of information on, rather than the actual paucity of the resource. Where information is available, there is indication that the groundwater resource is relatively undeveloped. This can be illustrated by the example of the Twin Cities artesian basin. It is estimated that this basin could safely yield about 600-700 mgpd. Present withdrawal is about 136 mgpd. Reluctance to develop this groundwater source has been due to improper analysis of data available. With the increased use of groundwater in rural areas more information and data must be obtained to provide for proper analysis of the resource. (See also W73-09113) (Knapp-USGS)
W74-00568

A REPORT OF PROGRESS AND CONCLUSIONS, (WASHINGTON, D.C. METROPOLITAN AREA WATER RESOURCES).
Washington Area Interstate Water Resources Program, D.C.
For primary bibliographic entry see Field 06D.
W74-00583

EL PASO'S WATER RESOURCES,
El Paso Water Utilities, Tex.
For primary bibliographic entry see Field 06D.
W74-00740

PRESENT AND FUTURE WATER USE AND ITS EFFECT ON PLANNING IN MARICOPA COUNTY, ARIZONA,
For primary bibliographic entry see Field 03D.
W74-00754

GROUNDWATER SURVEY OF THE ERBIL PROJECT AREA,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
R. H. Haddad.
Technical Bulletin 50. May 1973. 28 p, 13 fig, 2 tab, 5 ref.

Descriptors: *Groundwater resources, *Hydrologic data, *Surveys, *Water chemistry, Aquifers, Exploration, Hydrogeology, Testing, Water levels, Geophysics.
Identifiers: *Iraq.

Carried out under a UNDP-UNESCO project, a groundwater survey of the Erbil Project area is part of the pre-project activity of a UNDP-FAO investigation. This reconnaissance stage is restricted to an inventory of information, and the collection, chemical analysis, and interpretation of groundwater samples of the area. The area is well endowed with good aquifers containing water of a quality generally suitable for irrigation and drinking. Recommendations include aquifer testing of existing pumped wells, water level observations (to be increased to weekly tests for a period of at least 6 months-year), estimates of present rates of withdrawal, discharge, and recharge, and finally, geo-electric prospecting. Information is given on the environment generally, including geology, climate, geomorphology, hydrogeology, and hydrochemistry of the area, with tables displaying the chemical analyses and classification of existing groundwater. (Paylore-Arizona)
W74-00761

BIBLIOGRAPHY OF REPORTS ON THE WATER RESOURCES OF INDIANA PREPARED BY THE U.S. GEOLOGICAL SURVEY, 1886--1972,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 02E.
W74-00814

GROUNDWATER RESOURCES OF THE USSR (RESURSY PODZEMNYKH VOD SSSR),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
For primary bibliographic entry see Field 02F.
W74-00845

PATTERNS OF LONG-TERM NATURAL FLUCTUATIONS OF GROUNDWATER LEVELS (ZAKONOMERNOSTI MNOGOLETNIKH YESTESTVENNYKH KOLEBANIY UROVNEY PODZEMNYKH VOD),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 02F.
W74-00846

POSSIBILITIES OF USING GEOPHYSICAL METHODS IN A STUDY OF FRESHWATER DISCHARGES IN LITTORAL ZONES OF SEAS (O VOZMOZHNOSTYAKH GEOFIZICHESKIKH METODOV PRI IZUCHENII RAZGRUZOK PRESNYKH VOD V PRIBREZHNYKH ZONAKH MOREY),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 02F.
W74-00847

FLUCTUATIONS IN NITRATE CONCENTRATIONS UTILIZED AS AN ASSESSMENT OF

AGRICULTURAL CONTAMINATION TO AN AQUIFER OF A SEMIARID CLIMATIC REGION,
Eastern New Mexico Univ., Portales.
For primary bibliographic entry see Field 05B.
W74-00850

METHODS OF COLLECTING AND INTERPRETING GROUND-WATER DATA.
Geological Survey. Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-00929

MODIFIED SOLUTIONS FOR DECREASING DISCHARGE WELLS,
California Univ., Davis. Dept. of Irrigation.
For primary bibliographic entry see Field 08B.
W74-00932

MECHANISM OF FLOW AND CONTROLLED DISSOLUTION OF SALT IN SOLUTION MINING,
Texas Univ., Austin.
For primary bibliographic entry see Field 08B.
W74-00934

GROUND WATER POLLUTION AND CONSERVATION,
C. K. Lewicke.
Environmental Science and Technology, Vol 6, No 3, p 213, 215, March, 1972.

Descriptors: Water sources, Water resources, Water supply, *Water law, *Water conservation, Hydrology, *Aquifer characteristics, *Groundwater pollution, *Groundwater management.
Identifiers: Zone of saturation, Zone of aeration.

A brief review of ground water, its occurrence, properties, advantages and problems is presented. The nature of ground water occurrence, movement and recharge is discussed. The importance of groundwater as a contributor to surface sources; as municipal and individual water sources; and the results of improper use of these ground water sources is discussed. The factors leading to ground water pollution and their short and long-term effects are discussed. The current efforts in ground water regulation in the areas of withdrawal and protection from contamination are described. (Campbell-NWWA)
W74-00938

PULSE TESTING: A NEW METHOD FOR DESCRIBING RESERVOIR FLOW PROPERTIES BETWEEN WELLS,
Esso Production Research Co., Houston, Tex.
For primary bibliographic entry see Field 08G.
W74-00939

HOW TO FIND ABANDONED OIL AND GAS WELLS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 08G.
W74-00941

MAXIMIZING WATER YIELD THROUGH WELL DEVELOPMENT--TECHNICAL MEMO NO. 2,
For primary bibliographic entry see Field 08B.
W74-00943

DETECTION AND ESTIMATION OF DEAD--END PORE VOLUME IN RESERVOIR ROCK BY CONVENTIONAL LABORATORY TESTS,
California Univ., Berkley.
For primary bibliographic entry see Field 08G.
W74-00944

BOREHOLE LOGGING INVESTIGATIONS IN THE CHALK OF THE LAMBOURN AND WINTERBOURNE VALLEYS OF BERKSHIRE,
Institute of Geological Sciences, London (England).
For primary bibliographic entry see Field 08G.
W74-00956

PUBLIC WATER SUPPLIES OF NORTH CAROLINA, PART I NORTHERN PIEDMONT,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 06D.
W74-01040

SEEPAGE FLOWS--FIELD DATA MEASUREMENTS FOR EVALUATION OF POTENTIAL CONTRIBUTION OF FERTILIZERS TO GROUNDWATER POLLUTION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 05B.
W74-01054

4C. Effects on Water of Man's Non-Water Activities

SALTS IN IRRIGATION DRAINAGE WATERS: I. EFFECTS OF IRRIGATION WATER COMPOSITION, LEACHING FRACTION, AND TIME YEAR ON THE SALT COMPOSITIONS OF IRRIGATION DRAINAGE WATERS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
J. D. Rhoades, R. D. Ingvalson, J. M. Tucker, and M. Clark.
Soil Science Society of America Proceedings, Vol 37, No 5, p 770-774, September-October 1973. 6 tab, 13 ref.

Descriptors: *Leaching, *Return flow, *Water pollution sources, Lysimeters, Water quality, Water chemistry, Salts, Alfalfa, Irrigation practices, Soil chemistry.

The compositions of percolated drainage waters resulting from the use of eight synthetic river waters of the Western USA under alfalfa production in a controlled lysimeter experiment were studied. The compositions are affected by the composition of e river water used for irrigation, the fraction of applied water that appeared as drainage water, the presence or absence of soil $CaCO_3$, whether or not the drainage water is open to the atmosphere, and the time of year. (Knapp-USGS)
W74-00609

SIMULATING EFFECTS OF HARVEST CUTTING ON SNOWMELT IN COLORADO SUBALPINE FOREST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. F. Leaf, and G. E. Brink.
National Symposium on Watersheds in Transition, June 19-22, 1972, Fort Collins, Colo, p 191-196. 7 fig, 2 tab, 33 ref.

Descriptors: Computers, Computer models, Coniferous forests, *Forest management, Model studies, Mountain forests, Simulation analysis, *Snowmelt, Vegetation effects, Watershed management, *Colorado, *Cutting management.

A recently developed dynamic model has produced tentative results regarding the probable effects of timber harvesting on snowmelt in a central Colorado subalpine watershed. Snowmelt rates in mature lodgepole pine and Engelmann spruce forest were compared against a hypothetical pattern of 5 tree-height diameter openings, cut into the watershed so that trees on 40 percent of the area were removed. The average effect for the 8 years simulated was to increase melt rates early in the melt season and diminish snowmelt later. Although harvest cutting affected timing by causing the bulk of the snowmelt to occur earlier, the duration of the snowmelt season was apparently not significantly changed. Early-season snowmelt was accelerated in the small openings, but in both natural forest and cut-over areas, the last snow melted at about the same time. (Forest Service)
W74-00686

SOILS AND WATER,
Forest Service (USDA), Asheville, N.C. Southeastern Forest Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00698

ENGINEERING REPORT ON SPECIAL ASSESSMENT STORM SEWER DISTRICT FOR THE NORTHEAST INDUSTRIAL DISTRICT, CITY OF KANSAS CITY, MISSOURI.
Riddle Engineering, Inc., Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W74-00802

PRELIMINARY STUDY FOR CENTRAL INDUSTRIAL DISTRICT SEWERS, DEPARTMENT OF PUBLIC WORKS, KANSAS CITY, MISSOURI.
Shafer, Kline and Warren, Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W74-00803

FLOOD STUDIES FOR SAFETY OF TVA NUCLEAR PLANTS: HYDROLOGIC AND EMBANKMENT BREACHING ANALYSIS,
Tennessee Valley Authority, Knoxville.
For primary bibliographic entry see Field 08A.
W74-00805

LONE PEAK WILDERNESS AREA, UTAH, AND DESIGNATING A SEGMENT OF THE COLORADO RIVER IN UTAH AS PART OF THE WILD AND SCENIC RIVERS SYSTEM.

Hearing--Subcomm. on Public Lands--Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 2d Sess, July 7, 1972. 134 p, 2 fig, 2 map, 4 photo, 4 tab.

Descriptors: United States, *Colorado River, *Utah, *Legislation, *National forests, *Administration, Regulation, Wild River Act, Recreation, Scenery, Water policy.
Identifiers: *Lone Peak Wilderness Area (Utah).

The first bill discussed, S.2901, would amend the Wild and Scenic Rivers Act by designating a segment of the Colorado River in the State of Utah as a component of the National Wild and Scenic Rivers System. The second bill, S.3466, would authorize the Secretary of Agriculture to review as to its suitability for preservation as wilderness the area commonly known as the Lone Peak Area in Utah. The area involved is approximately 13,000 acres within the Wasatch and Uinta National Forests. The Lone Peak Area is not classified as a national forest primitive area but is included among the areas the Forest Service is now considering for inclusion in the national wilderness preservation system. S.3466 would designate the Lone Peak a wilderness before completion of an intensive study and review process similar to that applicable to national forest primitive areas. For this and other resons many of the witnesses appearing before the subcommittee indicated that such a review should be accomplished before the Lone Peak area be designated as wilderness. (Mockler-Florida)
W74-00874

SOUTHERN CALIFORNIA'S DETERIORATING MARINE ENVIRONMENT, AN EVALUATION OF THE HEALTH OF THE BENTHIC MARINE BIOTA OF VENTURA, LOS ANGELES AND ORANGE COUNTIES,
Center for California Public Affairs, Claremont.
For primary bibliographic entry see Field 05C.
W74-00877

4D. Watershed Protection

SUBURBAN AMERICA: POPULATION DYNAMICS AS RELATED TO WATER RESOURCES PLANNING,
Wapora, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-00553

SOILS AND WATER,
Forest Service (USDA), Asheville, N.C. Southeastern Forest Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00698

PRICKETT CREEK WATERSHED, WEST VIRGINIA (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04A.
W74-00860

LOST CREEK WATERSHED, NEWTON COUNTY, MISSOURI (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as EIS-MO-73-0098-F $4.25 in paper copy, $1.45 in microfiche. January 1973. 40 p, 1 map, 1 tab.

Descriptors: *Missouri, *Environmental effects, *Watershed development, Flood control, Recreation, Land use, Dams, Flood prevention, Flood plain development, Agriculture, Wildlife habitat, Parks, Ecology.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act, *Newton Co., Mo.

The project consists of land treatment measures, seven floodwater retarding dams, and three debris basins. Flood damage to 1,877 acres of agricultural lands will be reduced and peak flows from the 100-year storm will be reduced 37 percent in Seneca. Sediment yield will be reduced 25 percent. The installation of the project will change the land use of areas needed for dams, spillways, and to store sediment, and, as a result, the intensification of agriculture in the flood plain is expected to reduce wildlife cover. Alternatives to the proposed project include land treatment only; increasing the capacity and efficiency of the channel; relocating damageable values and providing zoning; construction of levees; and developing flood-prone lands for purposes little affected by flooding such as parks, tree farms, or wildlife areas. The Lost Creek Watershed project is located in Newton County, Southwest Missouri, and contains 39,100 acres or approximately 61 square miles within the Arkansas River Basin, and flows into the Grand Lake of the Cherokees. (Mockler-Florida)
W74-00880

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME I.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00890

EFFECT OF THE POLYMER K-4 ON THE RESISTANCE OF LIGHT CHESTNUT SOIL COVER TO EROSION BY WATER, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics.
Y. Ya. Grigor'ev.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 3, p 98-101. 1972. Illus. (English summary).
Identifiers: *Erosion control, *Polymer K-4, Resistance, *Soil cover, Soil treatment.

The optimum concentration of polymer K-4 for the soils is 0.025-0.1%. Such doses prevent erosion of clay and loam soils by the bottom speed of the stream (V delta) 30-40 cm/sec and of sandy-loam soils by the bottom speed of the stream (V delta) 19-25 cm/sec.--Copyright 1973, Biological Abstracts, Inc.
W74-00988

05. WATER QUALITY MANAGEMENT AND PROTECTION

HYDROCARBON INCORPORATION INTO THE SALT MARSH ECOSYSTEM FROM THE WEST FALMOUTH OIL SPILL,
Woods Hole Oceanographic Institution, Mass.
K. A. Burns, and J. M. Teal.
Available from NTIS, Springfield, Va., 22151 as COM-73-10419 Price $3.00 printed copy; $1.45 microfiche. Report, Reference No. 71-69, November 1971. 24 p, 31 fig, 1 tab, 5 ref. Grant 14-17-0007-1128 (BCF). Grant GA-28365 (NSF).

Descriptors: *Water pollution sources, *Oil spills, *Bays, *Massachusetts, Environmental effects, Ecosystems, Path of pollutants, Marshes, Sampling, Chemical analysis, Organic compounds, Cores, Mud, Marsh plants, Bottom fish, Data collections, Evaluation, Ecology.
Identifiers: *Buzzards Bay (Mass), *Wild Harbor Marsh (Mass), Hydrocarbons.

The oil barge 'Florida' ran aground just off Little Island, West Falmouth, Massachusetts on September 16, 1969. About 175,000 gallons of Number Two fuel oil leaked into Buzzards Bay and the adjacent Wild Harbor Marsh. Samples of marsh muds and organisms collected nearly a year after the spill were analyzed for movement of polluting hydrocarbons through the marsh ecosystem. The dead areas were the most heavily polluted. A deep mud core in the dead area showed oil has penetrated to at least 70 cm. Virtuallly all the marsh organisms living in the contaminated area were affected by the oil at least to the extent that they accumulated oil hydrocarbons in their tissues. Two processes may occur as the oil passes through the marsh ecosystem. There may be a progressive loss in the straight chain hydrocarbons in relation to branched chain, cyclic and aromatic hydrocarbons. There also appears to be a selection for the higher boiling fractions of the contaminants higher up in the food chain. (Woodard-USGS)
W74-00824

5A. Identification of Pollutants

BIOTA OF FRESHWATER ECOSYSTEMS IDENTIFICATION MANUAL NO. 10 GENERA OF FRESHWATER NEMATODES (NEMATODA) OF EASTERN NORTH AMERICA,
Purdue Univ., Lafayette, Ind. Dept. of Entomology.
For primary bibliographic entry see Field 02I.
W74-00563

BIOTA OF FRESHWATER ECOSYSTEMS IDENTIFICATION MANUAL NO. 11 FRESHWATER UNIONACEAN CLAMS (MOLLUSCA:PELECYPODA) OF NORTH AMERICA,
Michigan Univ., Ann Arbor. Dept. of Zoology.
For primary bibliographic entry see Field 02A.
W74-00564

REMOTE SAMPLER FOR DETERMINING RESIDUAL OIL CONTENTS OF SURFACE WATERS,
Naval Ship Research and Development Center, Annapolis, Md.
For primary bibliographic entry see Field 05G.
W74-00584

RECOVERY OF BACTERIOPHAGE FROM CONTAMINATED CHILLED AND FROZEN SAMPLES OF EDIBLE WEST COAST CRABS,
Notre Dame Coll., Belmont, Calif. Dept. of Biology.
R. DiGirolamo, and M. Daley.
Applied Microbiology, Vol 25, No 6, p 1020-1022, June 1973. 1 fig, 1 tab, 13 ref.

Descriptors: *Bacteriophage, *Crabs, *Storage, *Temperature, Viruses, Crustaceans, Shellfish, E. coli, Freezing, Assay, Pollutant identification, Pollutants.
Identifiers: *Cancer magister, *Cancer antennarius, Recovery, Survival, Coliphage T4, Escherichia coli B, Enteroviruses.

Edible West Coast crabs (Cancer magister and C. antennarius) were contaminated with bacteriophage and then held in a chilled or frozen state. Two separate series of experiments were carried out whereby the crabs were, respectively, exposed to 50,000 and 46,000 phage plaque-forming units (PFU) per ml of seawater for 24 h. The results of the chilling experiments which used contaminated unprocessed and processed boiled crabs exhibited a gradual decrease in virus titer in all samples during the entire test period. After 120 h, however, 7000 virus PFU/g were still recovered from the unprocessed crabs and 45 virus PFU/g from processed samples. The freezing studies also showed a gradual decrease in virus titer during the entire experimental period. After 20 days of storage 15,000 virus PFU/g from the frozen unprocessed crabs and 140 virus PFU/g from the processed samples were recovered. This represents survival or recovery rates of approximately 42 and 55 percent, respectively. At the end of the study (30 days), 12,000 virus PFU per g were still found to be present in the unprocessed samples, and 45 PFU per g were recovered from the processed samples. (Holoman-Battelle)
W74-00613

DIFFERENTIAL COUNTING IN MIXED CULTURES WITH COULTER COUNTERS,
Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Science.
J. F. Drake, and H. M. Tsuchiya.
Applied Microbiology, Vol 26, No 1, p 9-13, July 1973. 2 fig, 3 tab, 9 ref.

Descriptors: *Microorganisms, Microscopy, Estimating, Reliability, Size, Methodology, Bacteria, E. coli, Yeasts, Fungi, Protozoa, Viability, *Cultures.
Identifiers: *Mixed cultures, *Coulter counter, *Differential counting, Lactobacillus casei, Bacillus licheniformis, Saccharomyces cerevisiae, Dictyostelium discoideum, Azotobacter vinelandii, Tetrahymena pyriformis, Colpoda, Hemacytometer, Viable count.

A critical comparison of Coulter, viable, and microscope counts for several mixed cultures of microorganisms has been made. This investigation shows that Coulter counting can provide relaible estimates of microbial numbers in mixed cultures. Precaustions and limitations of Coulter counting in mixed cultures are discussed. (Holoman-Battelle)
W74-00614

SOME OBSERVATIONS ON THE INCORPORATION OF NOVOBIOCIN INTO HEKTOEN EN-

TERIC AGAR FOR IMPROVED SALMONELLA ISOLATION,
Campbell Inst. for Food Research, Camden, N.J.
D. A. Hoben, D. H. Ashton, and A. C. Peterson.
Applied Microbiology, Vol 26, No 1, p 126-127, July 1973. 1 tab, 3 ref.

Descriptors: *Isolation, *Salmonella, *Antibiotics (Pesticides), *Pollutant identification, Inhibition, Bactericides, Slectivity, Enteric bacteria, E. coli.
Identifiers: *Novobiocin, *Hektone enteric agar, Culture media, Selective media, Salmonella cubana, Serotypes, Salmonella seftenberg, Salmonella typhimurium, Salmonella urbana, Salmonella montevideo, Salmonella wothington, Citrobacter fruendii, Proteus mirabilis, Proteus morganii, Citrobacter diversus.

A preliminary study was conducted to determine whether the selectivity of Hektoen enteric agar (HEA) for Salmonella isolation could be improved by the incorporation of an appropriate concentration of novobiocin. Pure cultures of salmonellae and related organisms were used. Broth cultures were surface plated in quadruplet at 2 different concentrations. HEA plates were incubated at 37C for 18-20 h prior to counting. When novobiocin at 5 or 10 micrograms/ml was incorporated into HEA, the Proteus and Citrobacter varieties employed in this study were inhibited. The E. coli varieties used presented no problems, because they produced salmon-colored colonies; however, the growth of most strains tested appeared reduced at these concentrations of antibiotic. Ten serotypes of Salmonella grew without any apparent inhibitory effects when novobiocin was used at 2, 5, 10, and 15 micrograms/ml in the HEA. At 20 micrograms of antibiotic per ml of agar, Salmonella grew, but at a much slower rate and without the production of the typical black-centered colonies. Novobiocin was stable at concentrations up to 20 micrograms/ml in HEA. Agar plates containing novobiocin stored for several weeks at 22C gave similar inhibitory results to freshly prepared plates with the nonsalmonellae. (Holoman-Battelle)
W74-00617

BACTERIAL ENDOTOXINS IN THE ENVIRONMENT,
Tulane Univ., New Orleans, La. Dept. of Physiology.
For primary bibliographic entry see Field 05B.
W74-00618

IDENTIFICATION AND CHARACTERIZATION OF THE MICROFLORA AND SPOILAGE BACTERIA IN FRESHWATER CRAYFISH PROCAMBARUS CLARKII (GIRAD),
Louisiana State Univ., Baton Rouge. Dept. of Food Science.
N. A. Cox, and R. T. Lovell.
Journal of Food Science, Vol 38, No 4, p 679-681, May/June 1973. 5 tab, 12 ref.

Descriptors: *Cultures, *Crayfish, *Food processing industry, *Separation techniques, *Pseudomonas, Pollutant identification.
Identifiers: Spoilage, *Achromobacter, Culture media, Sample preparation, Alcaligenes, Micrococcus, Flavobacterium, Aerobacter, Bacillus, Lactobacillus, Sarcina, Proteus, Procambarus clarkii, Staphylococcus.

Unwashed peeled tail meat of freshwater crayfish (Procambarus clarkii) was collected from processing lines, stored up to 24 days at OC and 5C, and analyzed for spoilage bacteria. Samples were homogenized in a blender, diluted with a phosphate buffer, and cultured with Milk-Protein Hydrolysate. A total of 280 isolated colonieswere randomly picked and generically identified. These cultures were inoculated into sterile crayfish substrate for evaluation of their ability to produce spoilage. Spoilage occurred when counts reached 1 billion per gram. Eleven different genera were found in the 280 isolates; three genera, Achromobacter, Alcaligenes, and Psudomonas comprised approximately 82 percent of the isolates. Micrococcus, Staphylococcus, and Alcaligenes made up the major portion of the bacterial flora in fresh tail meat whereas Pseudomonas and Achromobacter predominated in the spoiled product. Classification of the bacteria according to spoilage rate showed Pseudomonas to predominate with Achromobacter a distant second. These two bacteria are concluded to be the predominant psychrophilic spoilage organisms in commercial crayfish tail meat. (Little-Battelle)
W74-00620

FATTY ACID COMPOSITION OF L-FORMS OF STREPTOCOCCUS FAECALIS CULTURED AT DIFFERENT OSMOLALITIES,
Veterans Administration Hospital-Wadsworth, Los Angeles, Calif. Research and Medical Service.
J. Z. Montgomerie, G. M. Kalmanson, and L. B. Guze.
Journal of Bacteriology, Vol 115, No 1, p 73-75, July 1973. 1 tab, 10 ref.

Descriptors: *Cultures, *Pollutant identification, Cytological studies, Organic acids, Chemical analysis, Aerobic bacteria, Lipids.
Identifiers: *Streptococcus faecalis, *Fatty acids, *Chemical composition, *Osmotic pressure, Chemotaxonomy, Flame ionization gas chromatography, Culture media.

The fatty acid composition of the membranes of three different penicillin-produced L-forms of Streptococcus faecalis was determined: (1) a stable (nonreverting) L-form (T53) cultured in brain heart infusion (BHI) with 0.5 M sucrose; (2) a stable L-form (T531) cultured in BHI without sucrose; and (3) an unstable L-form (T9) cultured in BHI with 0.5 M sucrose and 1,000 U of penicillin per ml. L-forms were obtained by centrifugation and lysed by washing in 1 mM tris (hydroxymethyl) aminomethane-hydrochloride buffer. The parent S. faecalis was also cultured in BHI and BHI containing 0.5 M sucrose, and washed with buffer. The fatty acid composition of L-forms of S. faecalis cultured in BHI without sucrose (370 mosmol) had higher C18:1 and lower C18 than L-forms cultured in the same media with added 0.5 M sucrose (950 mosmol) in both exponential and stationary cultures. In the stationary phase of growth, C19 was reduced in the L-forms cultured without sucrose. Similar changes were seen in the parent S. faecalis cultured in the two types of media. These changes in membrane fatty acids may relate to osmo-regulation of the L-forms. (Holoman-Battelle)
W74-00622

MOLECULAR RELATIONSHIPS AMONG THE SALMONELLEAE,
Walter Reed Army Inst. of Research, Washington, D.C.
For primary bibliographic entry see Field 05B.
W74-00623

FACTORS WHICH INFLUENCE THE ENUMERATION OF BDELLOVIBRIO BACTERIOVORUS IN SEWAGE AND RIVER WATER,
University of Wales Inst. of Science and Tech., Cardiff.
D. G. Staples, and J. C. Fry.
Journal of Applied Bacteriology, Vol 36, No 1, p 1-11, March 1973. 5 fig, 5 tab, 19 ref.

Descriptors: *Sewage, Rivers, Methodology, *Pollutant identification, Hosts, Pollutants, Natural streams, Protoza, Bacteria, Parasitism, Centrifugation, Isolation, E. coli, Water sampling.
Identifiers: *Enumeration, *Pretreatment, Sample preparation, *Bdellovibrio bacteriovorus, Double layer plating technique, Culture media, Escherichia coli B, Pseudomonas aeruginosa, Proteus vulgaris, Escherichia coli K12, Aerobacter aerogenes, Serratia marcescens, Pseudomonas fluorescens, Arthrobacter ureofasciens, Achromobacter, Membrane filters, Homogenization, Lactobacillus plantarum, Culturing techniques.

A double layer plating technique was used for counting Bdellovibrio bacteriovorus in river water and sewage samples. The optimum conditions for enumeration were provided by dilute media with 0.6 percent of agar as the top layer, incubated for 6 days at 30 degrees with Achromobacter sp. as the host. Pretreatment of samples affected counts: centrifugation and membrane filtration reduced the bdellovibrio count, homogenization increased it. Protozoa in sewage samples caused large plaques that greatly hindered counting and attempts to eliminate these plaques were unsuccessful. The highest counts in sewage samples averaged 900 cells/ml. (Holoman-Battelle)
W74-00624

ON THE ISOLATION OF VIRUS FROM SEWAGE TREATMENT PLANT SLUDGES,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark).
E. Lund, and V. Ronne.
Water Research, Vol 7, No 6, p 863-871, June 1973. 9 tab, 6 ref.

Descriptors: *Viruses, *Isolation, *Sewage sludge, *Sewage treatment, *Pollutant identification, Methodology, Municipal wastes, Biological treatment, Chemical degradation, Activated sludge, Sewage effluents, Chemical precipitation, Pollutants, Centrifugation, Lime, Cultures, Ethers.
Identifiers: Pollutant removal, Coxsackie virus B3, Adenovirus 3, Coxsackie virus B1, Coxsackie virus B5, Ferric chloride, Aluminum sulfate, Echovirus 19, Decontamination, Concentration.

Sludges from biological and chemical treatments of urban sewage were examined for virus. The virus isolations were made in tube cultures of HeLa cells. The cells were grown in a medium consisting of 7 percent calf serum in Hanks' solution to which 0.5 percent lactalbumin hydrolysate and antibiotics were added. The tubes contained 2 ml of medium, and the inoculum was 0.1 ml. Each sample was inoculated in 4 tubes. Blind passages were carried out twice from each negative culture, each time after an incubation period of 7 days at 37C. No isolation was considered positive before typing by neutralization was made. Virus was found bound to particles and was not eluated at pH 9.0 in the samples from activated sludge treatment. The secondary sludge contained less virus than the primary sludge. The isolated virus type were Coxsackie B strains, ECHO strains and Adenovirus strains. Treatment with lime, ferric chloride and aluminum sulfate in experimental scale removed virus from raw sewage so that virus could be demonstrated in the sludge from sewage where virus was not demonstrated. No virus inactivation in the chemical sludges were observed. (Holoman-Battelle)
W74-00628

THE EFFECT OF PRETREATMENTS ON THE VIRUS CONTENTS OF SEWAGE SAMPLES,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark).
E. Lund.
Water Research, Vol 7, No 6, p 873-879, June 1973. 3 tab, 7 ref.

Descriptors: *Viruses, *Isolation, *Pollutant identification, Methodology, *Activated sludge, *Sewage sludge, Biological treatment, Centrifugation, Sewage, Pollutants, Ethers, Cultures, Domestic wastes, Industrial wastes, Sewage effluents, Storage, Influents.

Identifiers: *Sample preparation, Concentration, Recovery, Coxsackie virus B3, Adenovirus 3, Adenovirus 2, Adenovirus 1, Adenovirus 5, Coxsackie virus B5.

Experiments were conducted to determine the effect of pretreatments (low speed centrifugation, decontamination and 2-phase concentration) of sewage and sluge samples on the recovery of virus from such samples. Five-liter dip samples were collected from two biological treatment plants and the virus isolations were made in tube cultures of HeLa cells. The cells were kept in a medium consisting of 7 percent calf serum in Hanks' solution of which 0.5 percent lactalbumin hydrolysate and antibiotics were added. Each sample was inoculated in 4 tubes using 0.1 ml inocula. The adsorption period was kept at 2 h as a compromise because sludge samples could not safely be allowed longer contact time. Blind passages were carried out twice from each negative or suspected culture; each time an incumbation period of 7 days at 37C was employed. No isolation was considered positive before typing by neutralization was successfully carried out. By isolations of virus from sewage and sluge samples, which had been fractionated by centrifugation at 9000 rev/min, it was found that virus may be particle bound and recoverable in the precipitates. An exception was the secondary sludge of the activated sludge treatment. It was thus indicated that removal of a part of a sewage or sludge sample before examination may make true quantitative estimations impossible. Re-examination of samples after storage at -20C for 6 months gave remarkably poor virus recoveries. (Holoman-Battelle)
W74-00629

LOW-COST FACILITIES FOR THE BACTERIOLOGICAL EXAMINATION OF DRINKING WATER SAMPLES,
Nairobi Univ. (Kenya). Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W74-00630

ALTERNATING CURRENT POLAROGRAPHY IN THE HARMONIC MULTIPLEX MODE. OBSERVATIONS ON THE USE OF DIGITAL SIGNAL CONDITIONING WITH THE FAST FOURIER TRANSFORM ALGORITHM,
Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
For primary bibliographic entry see Field 07C.
W74-00631

POLAROGRAPHIC STUDY OF CALOMEL ELECTRODE IN ANHYDROUS FORMIC ACID,
Quebec Univ., Rimouski (Quebec). Dept. of Pure Sciences.
For primary bibliographic entry see Field 02K.
W74-00633

SPINNING DROPPING MERCURY ELECTRODE-A PRACTICAL ANALYTICAL TOOL,
Saint John's Univ., Jamaica, N. Y. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-00634

AN AMMONIUM ION-SPECIFIC ELECTRODE,
Gulf South Research Inst., New Oreleans, La. Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W74-00636

ELECTROCHEMICAL STUDY OF A HETEROGENEOUS COPPER (II)-SELECTIVE ELECTRODE; STUDY OF SELECTIVITY AND POTENTIAL STABILITY,
Technical Univ. of Budapest (Hungary). Inst. for General and Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W74-00637

REMOTE SENSING OF OIL SLICKS,
S. Axelsson, and E. Ohlsson.
AMBIO, Vol 2, No 3, p 70-76, 1973. 6 fig, 14 ref.

Descriptors: *Oil spills, *Remote sensing, *Pollutant identification, *Environmental effects, *Oil pollution, Aerial photography, Mapping, Thin films, Wind velocity, Films, Water quality, Cloud cover, Sea water, Solar radiation, Water pollution, Pollutants, Photogrammetry.
Identifiers: *Data interpretation, Accuracy, Microwave sensors, Crude oil, Fuel oil, Thermal infrared imagery, Infrared imagery, Marine environment.

The frequent marine oil spills point out the need for effective methods of oil slick detection and surveillance. The most efficient means for localizing a spill and measuring its extent is the use of airborne remote sensing systems. The fundamental relation between the remote sensing signal and oil slick characteristics is investigated. The discussion is based upon results from a study for the Swedish Board for Technical Development. Due to differences between the material properties of oil and water, an oil slick is detectable in most wavelength bands. The capability of mapping thin oil slicks varies with the wavelength used. The amount of cloud cover also has a great influence on the contrast and the optimum wavelength band for mapping. A significant relation also exists between the contrast and the thickness of the oil film in some parts of the spectrum, particularly in the green band, thermal infrared (IR) and the microwave region. The multiband signature is also related to the oil type. The main interpretation problem is that the oil signature is also influenced by environmental parameters like amount of cloud cover, sea state, wind speed, water quality, and attenuation and scattering of the atmosphere. The accuracy of the interpretation is highly improved is information about these parameters is available. Particularly the thickness mapping can be performed more efficiently if it is possible to calibrate the interpretation model by thickness values from a few points of the slick. The quality of the extracted data about the oil slick is also enhanced if information from different wavelength bands is combined. If microwave sensors are included, the system can also operate during all weather conditions. (Holoman-Battelle)
W74-00638

SAMPLING FOR WASTE WATER ANALYZERS. PART I: SYSTEMATIC APPROACH,
Union Carbide Corp., South Charleston, W. Va.
J. W. Sugar, and J. H. Brubaker.
Instrumentation Technology, Vol 20, No 6, p 27-32, June 1973. 6 fig.

Descriptors: *Water sampling, *Instrumentation, Methodology, *Water water (Pollution), *Planning, Water pollution, Water pollution sources, Pollutants, Measurement, Monitoring, Water analysis, Mechanical equipment, Interfaces, Effluents, Streams, Reliability.
Identifiers: *Waste water analyzers, *Sampling equipment, Sample preparation.

A systematic approach to the design of a sampling conditioning system has been suggested for improving the reliability of such a system. Poor instrument reliability is caused primarily by the fouling of the sampling system or malfunction of the analyzer components that are continuously exposed to the polluted samples. Assuming that the correct analyzer has been chosen for a given application, there are 8 aspects of sampling that require in-depth consideration if a functional support package for the instrument is to be assembled. These 8 areas are: measurement objective, sample point, sample probe, pumping system, transfer lines, sample conditioning, analyzer interface (stream selection), and analyzers. (See also W74-00643) (Holoman-Battelle)
W74-00642

SAMPLING FOR WASTE WATER ANALYZERS. PART II: EFFECTIVE APPLICATIONS,
Union Carbide Corp., South Charleston, W. Va.
J. W. Sugar, and J. H. Brubaker.
Instrumentation Technology, Vol 20, No 8, p 39-43, August 1973. 7 fig.

Descriptors: *Water sampling, *Instrumentation, *Prototypes, Waste water (Pollution), Mechanical equipment, On-site tests, Sewers, Prototype tests, Water pollution, On-site data collections, Waste dilution, Interfaces, Water analysis, Pumps, Pumping, Reliability.
Identifiers: *Waste water analyzers, *Stream sample conditioner, *Sampling equipment, Sample preparation, Sample dilution.

A prototype hardware package is described which has been used to verify the sample conditioning system design and conditioning philosophy which were developed in Part I of the study. The portable sample conditioner equipped with a conditioner package which was built for mobility and versatility has been used in field tests. Every function deemed necessary in obtaining the selected conditioning goals can be evaluated with this portable unit. It can handle pressurized sewers, as well as unpressurized ones. Pumps can be interchanged to get the desired lift and head; sample dilution can be performed with clean water at ratios ranging from 2:1 to 30:1. Ratios above 30:1 are possible but uncommon. The sample can be depressurized and repressurized. The unit is also equipped to evaluate the performance of those components in a total carbon analyzer that are in intimate contact with the sample (e.g., sample inject valve, reaction chamber, catalyst and associated components). An infrared analyzer can be connected to the reactor if desired. With this system, alterations can be made in philosophy to correct for poor historical data, lack of experience on a particular type of stream, or simply an incorrect choice of hardware. This prototype can now be loaned to a plant or individual unit for approximately 500-1,000 dollars per application. A 1,000 dollar field test is a good investment when plans are being formulated to install a 30,000 dollar measurement system. This price includes typical costs for a concrete pad, building, heating, plumbing, sample conditioner, and analyzer. Some of the more typical applications such as solids removal and sample dilution are reviewed in some detail. (See also W74-00642) Holoman-Battelle)
W74-00643

BIODEGRADATION OF NITRILOTRIACETATE (NTA) BY BACTERIA-I. ISOLATION OF BACTERIA ABLE TO GROW ANAEROBICALLY WITH NTA AS A SOLE CARBON SOURCE,
Karolinska Institutet, Stockholm (Sweden). Dept. of Applied Microbilogy.
S-O.Enfors, and N. Molin.
Water Research, Vol 7, No 6, p 881-888, June 1973. 3 fig, 4 tab, 17 ref.

Descriptors: *Microbial degradation, *Nitrilotriacetic acid, *Anaerobic conditions, *Isolation, *Aerobic conditions, *Anaerobic bacteria, Aquatic bacteria, Biodegradation, Nutrients, Cultures, Metabolism, Water pollution.
Identifiers: Substrate utilization, Fate of pollutants, Culture media, Enrichment, Characterization, Biochemical characteristics, Bacterial physiology.

An investigation was conducted to determine if bacteria exist that are capable of degrading NTA in oxygen-depleted environments. Mud samples taken from the bottom of sewage contaminated

shallow waters were shaken with water from the collection site and filtered through paper under vacuum. The filtrate was used to inoculate the culture media that were used; a trace element solution containing Zn, Cu, Mn, and Co was also added to these media. Strains of bacteria that were able to utilize nitrilotriacetate under aerobic and anaerobic conditions were isolated from the sampled environment. One of these strains (NTA-A2) is a faculative anaerobe which grows under anaerobic conditions on NTA if nitrate is available in the medium. (Under aerobic conditions this strain can utilize acetate, glucose and some other sugars as well as NTA but not EDTA (ethylenediaminotetraacetate) or lactose as the sole carbon source. The properties and characteristics of the strain NTA-A2 are described. (See also W74-00645) (Holoman-Battelle)
W74-00644

EFFECT OF TEMPERATURE OF INCUBATION ON PERFORMANCE OF MEDIA IN THE DETECTION OF ENTERIC PATHOGENS,
East Jefferson General Hospital, Metairie, La.
W. I. Taylor, and D. Schelhart.
Applied Microbiology, Vol 25, No 6, p 940-944, June 1973. 3 tab, 12 ref.

Descriptors: *Enteric bacteria, *Pathogenic bacteria, *Aerobic bacteria, *Isolation, *Temperature, Salmonella, Shigella, Incubation, E. coli, Cultures, Methodology, Pollutant identification.
Identifiers: *Culture media, Enrichment, Agars, Broths, Edwardsiella tarda, Arizona hinshawii, Providencia, Staphylococcus aureus, Salmonella typhi, Salmonella typhimurium, Salmonella oranienburg, Salmonella infantis, Salmonella blockley, Salmonella java, Salmonella anatum, Salmonella newport, Salmonella thompson, Salmonella heidelberg, Salmonella manhattan, Salmonella mississippi, Salmonella montevidea, Salmonella muenchen, Shigella dysenteriae, Shiegella flexneri, Shigella boydii, Shigella sonnei.

The effect of incubation temperatures on the efficacies of both plating media and transport or enrichment broths was determined by the analysis of 391 diarrheal stools for salmonellae and shigellae. Each analysis resulted in 90 observations. Stool specimens were homogenized in saline and used to inoculate eosin methylene blue (EMB), Salmonella-Shigella (SS), and xylose lysine deoxycholate (XLD) agar plates, Amies and Cary-Blair (CB) transport media, and gram-negative (GN) enrichment broth. All media were incubated at 25, 30, and 35 C for 24 and 48 h. In order of efficacy, GN and saline were significantly better than Amies and CB, which were still better than direct streaking for both salmonellae and shigellae. Forty-eight hours was a significant improvement over 24 h only at 25 C on direct streaking for both pathogens. In direct plating, XLD was better than both SS and EMB for both pathogens. After broths for salmonellae, XLD greater than SS greater than EMB, and for shigellae, XLD greater than EMB greater than SS, with all differences significant. SS agar was significantly improved for detection of shigellae with 48-h broth inocula versus 24-h broth inocula. The differences thus observed at the various temperatures tested proved to be less important than the media used. The efficient media, GN broth, saline-stool, and XLD were shown to be affected very little by either temperature or time variance of the magnitude tested. (Holoman-Battelle)
W74-00646

POLYMER MEMBRANE ELECTRODES. PART I. A CHOLINE ESTER-SELECTIVE ELECTRODE,
Corning Glass Works, N. Y. Research and Development Lab,.
For primary bibliographic entry see Field 02K.
W74-00647

POLYMER MEMBRANE ELECTRODES. PART II. A POTASSIUM ION-SELECTIVE MEMBRANE ELECTRODE,
Corning Glass Works, N. Y. Research and Development Lab.
For primary bibliographic entry see Field 02K.
W74-00648

A STUDY OF LIQUID-MEMBRANE PERCHLORATE-SELECTIVE ELECTRODES MADE FROM AN ORGANIC RADICAL ION SALT,
Umea Univ. (Sweden). Dept. of Analytical Chemistry.
M. Sharp.
Analytica Chemica Acta, Vol 65, No 2, p 405-416, July 1973. 4 fig, 2 tab, 12 ref.

Descriptors: *Aqueous solutions, Water analysis, Anions, Selectivity, Iodides, Nitrates, Sulfates, Bromides, Fluorides, Chlorides, *Electrodes.
Identifiers: *Perchlorates, *Liquid membrane electrodes, *Perchlorate electrodes, *Ion selective electrodes, Detection limits, Response time, Chemical interference, Membrane electrodes, N-ethylbenzothiazole-2 2'-azaviolene perchlorate, Tetrafluoroborate, Hydroxyl ion, Chlorates, Selectivity coefficients, Acetates.

Liquid-membrane electrodes were prepared from solutions of N-ethyl-benzothiazole-2, 2'-azaviolene perchlorate in 1,2-dichlorobenene and in Beta-beta prime dichlorodiethyl ether, and their response and selectivity characteristics were examined. Perchlorate response ranges of the order 1-10 to the minus 6.5 power M and 1-10 to the minus 5.6 power M were shown to be attainable with the two systems, respectively. These values represent significant improvements over the range 1-10 to the minus 4.8 power M found for the solid state electrode made from the same radical ion salt. Short response times and acceptably stable potentials were observed for both liquid-membrane sensors. Both showed high apparant selectivities for perchlorate over all the ten anions tested (I, BF4, OH, NO3, C13, SO4, Br, F, CH, CO2, C1). Iodide and tetrafluoroborate were the most serious interferences in each case. The low interference shown by hydrogen and hydroxide ions indicated that perchlorate determinations may be performed within the pH range 1-12 with both electrodes. (Little-Battelle)
W74-00649

ANION SELECTIVITY STUDIES ON LIQUID MEMBRANE ELECTRODES,
Florida Atlantic Univ., Boca Raton. Dept. of Chemistry.
R. E. Reinsfelder, and F. A. Schultz.
Analytica Chimica Acta, Vol 65, No 2, p 425-435, July 1973. 2 fig, 6 tab, 34 ref.

Descriptors: *Anions, *Selectivity, Permselective membranes, Ion exchange, Chlorides, Bromides, Iodides, Nitrates, Equilibrium, *Electrodes.
Identifiers: *Liquid membrane electrodes, *Ion selective electrodes, Tris (1 10-phenanthroline)iron, Tris (4 7-diphenyl-1 10-phenanthroline)iron, Potentiometry, Selectivity coefficients, Organic solvents, Nitrobenzene, Chloroform, N-Amyl alcohol, Thiocyanates, Perchlorates, Fluoroborates, Fluorophosphides, Tetraheptylammonium ion, Calcium electrodes, Tetraheptylammonium nitrate, Tetraheptylammonium ion electrodes, Nitrate electrodes, Perchlorate electrodes, Tetrafluoroborate.

Selectivity coefficients of liquid-membrane electrodes for common inorganic anions were measured in electrodes containing tris (1,10-phenanthroline)iron (II), tris (4, 7-diphenyl-1, 10-phenanthroline)iron (II) or tetraheptylammonium ion in nitrobenzene, and tris (4, 7-diphenyl-1, 10-phenanthroline)iron (II) ion in nitrobenzene, chloroform or n-amyl alcohol as the liquid membrane. With the exception of the amyl alcohol electrode, selectivity coefficients were relatively independent of membrane composition and followed a common sequence of decreasing selectivity: PF6 (minus) greater than C104 (minus) greater than SCN (minus) equivalent to I (minus) equivalent to BF4 (minus) greater than NO3 (minus) greater than Br (Minus) greater than C1 (minus). This sequence parallels the order of increasing anion hydration energy, suggesting that aqueous phase solvation energies play a predominant role in determining electrode selectivity for these ions. Time-dependent behavior of liquid-membrane electrodes on transfer between solutions containing different ions also is desceibed. Instantaneous e.m.f. readings were used to determine selectivity coefficients. (Holoman-Battelle)
W74-00650

ELECTRON MICROSCOPE AND PHYSICAL CHEMICAL CHARACTERIZATION OF C--PHYCOCYANIN FROM FRESH EXTRACTS OF TWO BLUE-GREEN ALGAE,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
M. Kessel, R. MacColl, D. S. Berns, and M. R. Edwards.
Canadian Journal of Microbiology, Vol 19, No 7, p 831-836, July 1973. 3 fig, 1 tab, 30 ref.

Descriptors: *Electron microscopy, *Aquatic algae, Cytological studies, *Cyanophyta, Plant pigments, Fluorescence.
Identifiers: C-phycocyanin, *Plectonema boryanum, *Calothrix parietina, Physical chemistry, *Photosynthetic pigments, Phycobilisomes, Sample preparation, Ultracentrifugation, Phormidium luridum, Sedimentation velocity centrifugation.

The particulate material (intact and dissociated phycobilisomes), adjacent to the thylakoids of Plectonema boryanum and Calothrix parietina, was examined in thin sections and in freshly prepared C-phycocyanin extracts. For the latter a method was developed using speroplasts of log-phase cells. When examined by sedimentation velocity centrifugation, the sedimentation coefficients of the rapidly extracted C-phycocyanin were found to be 18 S and 5 S. Also, a 10-S boundary was observed with P. boryanum. When C. parietina was grown under red light the 18-S aggregates increased to 20 S. The 18 S particles, in electron micrography of negatively stained preparations, displayed eight subunits surrounding a central one. The possibility that some subunits fall out of the plane of view is contemplated in proposing a dodecamer arrangement for such particles. The 20-S particles were also examined by electron microscopy. However, the precise number of monomer units associated with either the 18-S or 20-S particles has not yet been ascertained. Thin sections of intact algal cells are presented to demonstrate the presence of phycobilisomes along the outer faces of the thylakoid membranes. (Holoman-Battelle)
W74-00652

MICROBIOLOGICAL EVALUATION OF COLD-WATER SHRIMP (PANDALUS BOREALIS),
Food and Drug Administration, Boston, Mass.
F. A. Zapatka, and B. Bartolomeo.
Applied Microbiology, Vol 25, No 6, p 858-861, June 1973. 2 tab, 11 ref.

Descriptors: *Shrimp, *Food processing industry, *E. coli, Foods, Coliforms, Path of pollutants, Water pollution sources.
Identifiers: *MPN, *Staphylococcus, Pandalus borealis, Biological samples, Macroinvertebrates.

Samples of shrimp (Pandalus borealis) were collected from fishing boats before unloading and in various stages of processing for determination of most probable numbers of E. coli, coliforms, and

coagulase-positive staphylococci and aerobic plate counts. Methods of the AOAC were used. Freshly harvested shrimp collected from fishing vessels had an APC geometric mean of 510/g; E. coli, coliforms, and coagulase-positive staphyloccocci were absent. Subsequent storage and insanitary practices during processing increased the APC and introduced coliforms. However, the low air temperatures (18 to 45 F) in the plants and the large volumes of cold water (34 F) used during processing inhibited significant bacterial buildup in the finished product. (Little-Battelle)
W74-00653

CLINICAL LABORATORY EXPERIENCE WITH THE IMPROVED ENTEROTUBE,
Long Island Jewish-Hillside Medical Center, New Hyde Park, N.Y.
B. G. Painter, and H. D. Isenberg.
Applied Microbiology, Vol 25, No 6, p 896-899, June 1973. 1 tab, 6 ref.

Descriptors: *Separation techniques, *Enteric bacteria, *Cultures, Methodology, Pullutant identification, Pathogenic bacteria, Coliforms, E. coli, Salmonella, Shigella.
Identifiers: *Enterotube, Method validation, Culture media, Arizona, Citrobacter freundii, Citrobacter diversus, Klebsiella pneumoniae, Enterobacter aerogenes, Enterobacter cloacae, Enterobacter hafniae, Enterobacter liquefaciens, Serratia marcescens, Proteus vulgaris, Proteus mirabilis, Proteus morganii, Proteus rettgeri, Providencia.

The improved Enterotube was tested with 586 representatives of the family Enterobacteriaceae to study its reliability in differentiating these bacteria. Several different media were also used in comparison tests to identify the microorganisms. The results show that the improved Enterotube has the ability to sequester significant reactions which lead to the identification of the various constituents of the family Enterobacteriaceae. Confirmation of the differentiation, especially of salmonellae, shigellae, arizonae, and enteropathogenic escherichiae, by seriological techniques is also suggested. The reactions elicited with the improved Enterotube compare favorably with those obtained with media prepared in the laboratory. The limitations of preparation and standardization, neglected or ignored in laboratories without adequate facilities, personnel, and experience, can be overcome with this type of device. In this study, the improved Enterotube reacted more closely to the findings reported in the percentage tables of Ewing than did the conventional method for the first approximation of the identity of members of the family. (Little-Battelle)
W74-00655

POTENTIAL PATHOGENS IN THE ENVIRONMENT: KLEBSIELLA PNEUMONIAE, A TAXONOMIC AND ECOLOGICAL ENIGMA,
Oregon State Univ., Corvallis. Dept. of Microbiology.
C. Brown, and R. J. Seidler.
Applied Microbiology, Vol 25, No 6, p 900-904, June 1973. 3 tab, 31 ref.

Descriptors: *Isolation, *Pathogenic bacteria, *Pollutant identification, Systematics, Vegetable crops, Seeds, Nitrogen fixing bacteria, Methodology, Aquatic environment, Soil environment, White fir trees, Enteric bacteria, Carrots, Lettuce, Onions, Potatoes.
Identifiers: *Klebsiella pneumoniae, *Serotypes, *Selective media, Biochemical characteristics, Environmental samples, Biochemical tests, Culturing techniques, Mushrooms.

A nitrogen-deficient medium and m-Endo agar were employed in the isolation of members of the tribe Klebsielleae from surfaces of vegetables and seeds. With m-Endo agar at an incubation temperature of 37C, nearly 50 percent of the vegetables and seven out of seven seed samples yielded organisms which biochemically and seriologically were identified as Klebsiella pneumoniae. Viable counts were generally in the range of 1000 cells per g of vegetable peel or seed. Organisms classified as K. pneumoniae exhibited seven different IMViC patterns, with the minus minus plus plus, plus plus plus plus, and minus plus plus plus patterns most common. Seven of the eleven K. pneumoniae serotypes encountered have previously been isolated from human urinary tract and other infections. Fifty percent of the 40 K. pneumoniae examined exhibited positive acetylene-reducing activity, i.e., they possessed the capability for fixing N2. Vegetables containing K. pneumoniae may constitute a potential reservoir for human nosocomial genitourinary or other infections. (Holoman-Battelle)
W74-00656

GENTAMICIN BLOOD AGAR USED AS A GENERAL-PURPOSE SELECTIVE MEDIUM,
Saint Joseph's Hospital, London (Ontario). Dept. of Microbiology.
W. A. Black, and F. Van Buskirk.
Applied Microbiology, Vol 25, No 6, p 905-907, June 1973. 1 tab, 6 ref.

Descriptors: *Isolation, *Pathogenic bacteria, Enteric bacteria, Coliforms, Aerobic conditions, Anaerobic conditions, Incubation, Yeasts, Cultures, Anaerobic bacteria, E. coli, Aerobic bacteria, Pseudomonas, Fungi, Methodology.
Identifiers: *Culture media, *Selective media, *Gentamicin blood agar, Survival, Gram-negative bacteria, Streptococci, Enterococci, Streptococcus viridans, Bacteroides, Clostridium perfringens, Serratia marcescens, Proteus, Staphylococci, Klebsiella, Enterobacter, Acinetobacter, Flavobacterium, Providence.

The potential value of a blood agar medium containing a final concentration of 5.5 micrograms of gentamicin per ml was assessed in a diagnostic laboratory over an 8-week period. Nine hundred sixty-six consecutive clinical specimens submitted to laboratory section were plated on routine culture media and then on one-quarter of a gentamicin blood agar (GBA) plate. In all cases the routine culture media contained 7.5 percent sheep blood agar plates for aerobic and anaerobic incubation and a MacConkey plate. The routine plates were read after 48 h incubation and the GBA plates after overnight incubation. Two hundred twenty-four of the specimens failed to grow on either routine culture media or GBA. The medium gave increased isolation rates of beta-hemoytic streptococci, other streptococci, Bacteroides, clostridia, and yeasts. Gentamicin-resistant gram-negative bacteria isolated only on GBA included 20 (26 percent) strains of Bacteroides and 10 (77 percent) strains of Providence. Gentamicin resistant gram-negative bacteria isolated on both GBA and routine culture media included three strains of Kebsiella-Enterobacter, and six strains of Serratia marcescens. GBA inhibited the growth of most strains of staphylococci and Klebsiella-Enterobacter, and all strains of Escherichia coli and Pseudomonas. (Holoman-Battelle)
W74-00657

IDENTIFICATION OF THE PROTOTHECA SPECIES BY IMMUNOFLUORESCENCE,
North Carolina Univ., Chapel Hill. School of Public Health.
M. S. Sudman, and W. Kaplan.
Applied Microbiology, Vol 25, No 6, p 981-990, June 1973. 2 fig, 6 tab, 22 ref.

Descriptors: *Pathogenic fungi, *Pollutant identification, Speciation, Chlorella, Methodology.
Identifiers: *Fluorescent antibody techniques, *Immunofluorescence, *Prototheca, Chromogenic reagents, Fluorescein isothiocyanate, Sample preparation, Prototheca filamenta, Prototheca moriformis, Prototheca stagnora, Prototheca wickerhamii, Prototheca zopfii, Prototheca pastoriensis, Prototheca chlorelloides, Prototheca trispora, Prototheca urbrizsyi, Coccidoides immitis, Blastomyces dermatitidis, Cryptococcus neoformans, Paracoccidioides brasiliensis.

Studies were carried out to develop fluorescent antibody reagents for the identification of the Prototheca species and for their differentiation from morphologically similar fungi of various genera in formalin-fixed tissues. Antisera against representative isolates of P. filamenta, P. moriformis, P. stagnora, P. wickerhamii, and P zopfii were produced in rabbits. Antiglobulins, labeled with fluorescein-isothiocyanate that intensely stained most cells of the homologous species, were selected for use as potential diagnostic reagents. By adsorbing the conjugates with selected heterologous cross-straining protothecae, reagents that were both sensitive and specific were obtained. Evaluation of the adsorbed conjugates with sections of tissue infected with protothecae, sections of tissue infected with morphologically similar fungi, and cultures of protothecae showed that these reagents are useful for the rapid and reliable identification of the Prototheca species. (Holoman
W74-00659

THE DETECTION OF CLOSTRIDIUM WELCHII IN THE DIFFERENTIAL REINFORCED CLOSTRIDIAL MEDIUM TECHNIQUE,
Ministry of Agriculture, Belfast (Northern Ireland).
P. A. Gibbs.
Journal of Applied Bacteriology, Vol 36, No 1, p 23-33, March 1973. 5 tab, 16 ref.

Descriptors: *Isolation, *Pollutant identification, Methodology, *Poultry, Anaerobic bacteria, Cultures.
Identifiers: *Differential reinforced clostridial medium, *Clostridium welchii, Poultry processing plants, Culture media, Clostridium bifermentans, Swab sampling, Counts, Animal tissues.

Studies were made to investigate the sensitivity of the DRCM (Differential Reinforced Clostridial Medium) techniques for isolating Clostridium welchii and to determine whether the method could be made more sensitive without increasing unduly the length of time necessary to obtain a result. Swab samples were taken of working surfaces and equipment and carcass samples from poultry processing plants. Water samples from one plant were taken from spinchillers and from a giblet washer. All DRCM cultures confirmed positive were streaked on lactose-egg yolk-milk (LEYM) medium for identification. Cultures of known strains of C1. welchii and C1. bifermentans were grown separately at 37 degrees in cooked meat broth. Microscopic counts and a total viable count using the pour plate technique with a tryptone-yeast extract (TYE) agar were made. Mixtures of the two bacteria were cultured using DRCM, incubated at 37 degrees for 48 h and scored positive or negative. All positives in the 'presumptive total' DRCM count, in the completed 'total' count, and in the spore count were streaked on LEYM for identification. Although the DRCM method can detect low numbers of clostridia, the detection of C1. welchii requires that all positive DRCM cultures in the 'presumptive total' count be examined before heat treatment for the presence of this species, and the LEYM agar medium affords a simple method for doing this. Data obtained on sampling 3 sites on each of 30 carcasses from the 3 processing plants showed that the vent and neck sites of carcasses from each plant had a markedly higher rate of contamination with clostridia than the breast, both in the 'total' count and in the spore count. (Holoman-Battelle)

W74-00661

A COMPARISON OF THE DISTRIBUTION OF INTESTINAL BACTERIA IN BRITISH AND EAST AFRICAN WATER SOURCES,
Newcastle-upon-Tyne Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W74-00662

A MEDIUM FOR COUNTING AQUATIC HETEROTROPHIC BACTERIA IN POLLUTED AND UNPOLLUTED WATERS,
University of Wales Inst. of Science and Tech., Cardiff.
For primary bibliographic entry see Field 05B.
W74-00663

RESPONSES OF A MIXED PHYTOPLANKTON POPULATION TO NUTRIENT ENRICHMENTS OF AMMONIA AND PHOSPHATE, AND SOME ASSOCIATED ECOLOGICAL IMPLICATIONS,
Freshwater Biological Association, Ambleside (England).
For primary bibliographic entry see Field 05C.
W74-00665

DIRECT MEASUREMENT OF POTASSIUM PERMANGANATE DEMAND AND RESIDUAL POTASSIUM PERMANGANATE,
New York State Dept. of Environmental Conservation, Delmar. Wildlife Research Lab.
R. Engstrom-Heg.
N Y Fish Game J. Vol 18, No 2, p 117-122. 1971.
Identifiers: *Direct measurement, *Potassium permanganate, Residuals, Analytical techniques, Pollutant identification.

In natural waters treated with KMnO4 nanate, residual KMnO4 and KMnO4 demand may be measured colorimetrically after appropriate dilution and treatment with orthotolidine. Procedures and formulas are given for determinations made with a spectrophotometer-colorimeter and for field determinations made with a color comparator.--Copyright 1973, Biological Abstracts, Inc.
W74-00765

ORGANOCHLORINE RESIDUES IN HARP SEALS (PAGOPHILUS GROENLANDICUS) CAUGHT IN EASTERN CANADIAN WATERS,
Ontario Ministry of Agriculture and Food, Guelph. Pesticide Residue Lab.
For primary bibliographic entry see Field 05C.
W74-00766

SAMPLING AND ANALYSIS OF CHEMICAL POLLUTANTS IN RIVER WATER,
Lee Conservancy Catchment Board (England).
D. C. Hinge.
Chemistry and Industry, No 15, p 727-732, August 4, 1973. 3 fig, 1 tab, 14 ref.

Descriptors: *Water analysis, *Pollutant identification, *Analytical techniques, *Monitoring, Rivers, Europe, *Water quality control, Water law, Legislation, Regulation, Computers, Automation, Instrumentation, Legal aspects, Hydrologic data, Testing procedures, Governments, Administration, Data processing.
Identifiers: Regional governments, *United Kingdom, Great Britain, Lee River.

In the United Kingdom, impetus for regional river authorities to provide facilities for monitoring stream quality came largely from the Rivers (Prevention of Pollution) Acts passed in 1951 and 1961, and the Water Resources Act of 1963. The work performed by the Lee Conservancy Catchment Board on the Lee River and its tributaries in a 500 square mile area with a population of about two million studies being conducted. Particular attention is being paid to nitrates and pesticides. Manual and instrumental techniques used are indicated, including gravimetry, colorimetry, titrimetry, electrochemical analysis, chromatography, atomic absorption spectroscopy/flame photometry, and other methods for routine determinations of suspended solids, sulfate, nitrogen and phosphorus compounds, detergents, herbicides, dissolved oxygen, and various metal trace elements. Future trends, started with the AutoAnalyzer, will include data collection and interpretation aided by computers. (Brown-IPC)
W74-00773

ANALYSIS OF WASTE WATERS AND INTERPRETATION OF THE RESULTS,
Imperial Chemical Industries Ltd., Billingham (England). Agricultural Div.
A. C. Docherty.
Proceedings of the Society for Analytical Chemistry, Vol 10, No 8, p 201-202, August 1973.

Descriptors: *Water analysis, *Analytical techniques, *Pollutant identification, *Monitoring, Toxicity, *Biochemical oxygen demand, Water pollution, *Industrial wastes, *Municipal wastes, Stream improvement, Rivers, Estuaries, Foreign countries, Waste water treatment, Instrumentation, Pollutants, Effluents, Fish, Ammonia, Zinc, Iron compounds, Chlorine, Chlorine compounds, Phenol, Ammonium compounds, Waste dilution, Persistence.
Identifiers: Total organic carbon (TOC), Continuous processes, Tees River (England), United Kingdom, British Water Research Association, Instrumental analysis, Cyanides, Chlorophenols, Hypochlorites, Synergism.

Pollution of the Tees Estuary is being reduced by a joint industry/local authority program that promises to halve the effluent pollution loads by 1975 and to lure fish back into the Tees River. Problems of waste water sampling, analysis, and data interpretation are illustrated. Simultaneous presence of several pollutants may cause either additive or cancelling effects. Thus, ionized ammonium salts in acid solution are nontoxic to fish, but can produce unionized ammonia, which is highly toxic, when the water pH approaches alkalinity. Similarly, the interaction of phenol with hypochlorite, both toxic, forms chlorinated phenol that is not only more toxic but also more odorous and more persistent than either reactant alone. By contrast, highly toxic cyanide, when complexed by iron, may form the much less toxic hexacyanoferrate ion. Limited monetary resources may, in addition, force a choice between alternative treatments, e.g., whether to eliminate cyanide (which is readily degraded biologically when diluted) or the less toxic zinc (which is, however, quite persistent in the environment, regardless of dilution). An instrumental method for the continuous monitoring of TOC (total organic carbon), developed by ICI Ltd. and the British Water Research Association, is recommended in lieu of the tedious five-day BOD test which is unsuited for the speedy characterization of industrial effluents. (Brown-IPC)
W74-00779

THE IDENTIFICATION OF SOURCES OF OIL SPILLS,
Laboratory of the Government Chemist, London (England).
D. M. Green, and J. Roburn.
Proceedings of the Society for Analytical Chemistry, Vol 10, No 8, p 202-203, August 1973.

Descriptors: *Oil spills, *Analytical techniques, *Pollutant identification, *Water pollution sources, Oil, Oil pollution, Fuels, Chromatography, Gas chromatography, Chemical analysis, Flame photometry, Mass spectrometry, Separation techniques, X-ray fluorescence, Spectroscopy, Sulfur compounds, Nickel, Evaporation, Weathering, Sampling, Organic compounds.
Identifiers: Molecular sieve chromatography (or Gel filtration), Fractionation, Vanadium, Isoprenes, Phytane, Pristane, Thiophenes, Naphthalenes, Atomic absorption spectroscopy, Hydrocarbons, Alkanes (or Aliphatic hydrocarbons).

Analytical techniques for tracing the sources of oil spills can greatly aid in the enforcement of water pollution laws. Temperature-programmed gas-liquid chromatography (GLC) with a packed column, nonpolar stationary phase, and flame-ionization detector gives hydrocarbon profiles which indicate the type of oil (crude, fuel, or tanker sludge). More specific characterizations can be obtained by separation of isoprenoid alkanes, phytane, pristane, and its 18-carbon homolog, using fractionation on Sephadex LH-20 columns plus gel filtration on silica gel and 5A molecular sieve. A few crude oils that are difficult to resolve by isoprenoid ratios, particularly after weathering, have been characterized by their vanadium and nickel contents, determined directly by x-ray fluorescence and atomic-absorption spectroscopy. Among other supporting evidence, distinct GLC profiles for many crude oils in combination with mass spectroscopy showed the presence of dibenzothiophenes having 11-15 carbon atoms and sufficiently high boiling points to limit evaporative losses, while C11-C13 naphthalenes were less useful for confirmatory analysis. Capillary gas chromatography can resolve mixtures of isoprenoids without prior separation, but given inferior reproducibility and is impractical for samples as small as 2-3 mg. For source identification of fuel oils, which vary much more in chemical composition, the availability of a suspect sample is essential. (Brown-IPC)
W74-00780

PROPOSAL OF A SIMPLIFIED MANOMETRIC METHOD FOR MEASURING BIOCHEMICAL OXYGEN DEMAND -- RESULTS AND PROBLEMS (VORSCHLAG EINER VEREINFACHTEN MANOMETRISCHEN METHODE ZUR MESSUNG DES BIOCHEMISCHEN SAUERSTOFFBEDARFS -- ERGEBNISSE UND P ROBLEME),
Institut fuer Zellstoff und Papier, Heidenau (East Germany).
H. Schmidt, and G. Weigt.
Zellstoff und Papier, Vol 21, No 5, p 131-140, May 1972. 8 fig, 6 tab, 17 ref.

Descriptors: *Biochemical oxygen demand, *Testing procedures, *Analytical techniques, *Water analysis, Laboratory tests, Instrumentation, Laboratory equipment, Kinetics, Foreign research, Waste water (Pollution), Water pollution, Organic loading.

A modified Warburg apparatus, called 'Biometer', is used in BOD determinations requiring only 2-4 days for complete decomposition of organic matter, compared to 5-7 days using the standard dilution method. The apparatus is rugged, inexpensive, and easy to operate with satisfactory (2-4%) accuracy, provided constant test conditions are maintained, including effluent composition. Optimum operating conditions were established after studies of variables involved. Kinetic studies indicated the conditions under which a reaction of the first order can be expected. Examples of BOD calculations based on short-term rate constant measurements are given. (Speckhard-IPC)
W74-00782

CHEMICAL ANALYSIS OF WATER EFFLUENTS -- LESSONS FROM THE U.S. (ARMY CORPS OF ENGINEERS) PERMIT PROGRAM,
Institute of Paper Chemistry, Appleton, Wis. Div. of Natural Materials and Systems.
D. B. Easty.
Paper Trade Journal, Vol 156, No 49, p 26-29, Nov. 27, 1972. 5 tab, 19 ref.

Descriptors: Water analysis, *Water permits, Analytical techniques, *Sampling, *Pollutant identification, *Pulp wastes, *Water pollution, *Permits, Discharge (Water), *Legislation, Regulation, Chemical analysis, Pulp and paper industry, Ammonia, Phosphates, Sulfur compounds, Sulfides, Sulfite liquors, Phenols, Organic compounds, Inorganic compounds, Nitrates, Odor, Taste, Color, Effluents, Industrial wastes.
Identifiers: River and Harbor Act.

Stricter enforcement of the 1899 River and Harbor Act required applications for discharge permits to be filed with the U.S. Corps of Engineers by July 1, 1971, listing analytical details on industrial outfalls. Paper mills unprepared to meet the deadline requested help from the Institute of Paper Chemistry (Appleton, Wis.), where a team of experts wrestled with the sampling and analytical problems imposed by the instability and mutual interference of some stream components. Using grab samples in addition to continuous samplers, specific preservatives (which are listed), and modified quantitative methods, the needed data were successfully suppled. Thus, interferences in the Nessler ammonia test were avoided by adopting the phenate method. A special charcoal ('-Nuchar C-190N') decolorized samples with minimum loss of nitrate. Interferences in the phenol red method of bromide analysis were removed by acid digestion followed by alkaline ignition of samples. Sulfides which caused atypical colors in phosphate determinations were removed with bromine water. Omission of the neutralizing step in the single-reagent method avoided formation of difficult to filtered precipitate in total phosphorus analyses. Mutual interference between sulfite and sulfide was minimized by selective absorption of sulfur dioxide before determining sulfides, and by precipitating sulfide prior to sulfite determinations. Although pulp mill effluents showed high phenol contents, not all phenolic compounds may contribute to objectionable odor and tast of receiving waters. (Brown-IPC)
W74-00791

WATER REUSE IN INDUSTRY, PART 3 -- MINE WATER,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 05D.
W74-00796

ADSORPTIVE EXTRACTION FOR ANALYSIS OF COPPER IN SEAWATER,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 02K.
W74-00827

DISTRIBUTION OF TRACE METALS IN THE PORE WATERS OF SHALLOW WATER MARINE SEDIMENTS,
Edinburgh Univ. (Scotland). Grant Inst. of Geology.
For primary bibliographic entry see Field 02K.
W74-00828

SEASONAL VARIATIONS OF CADMIUM, COPPER, MANGANESE, LEAD, AND ZINC IN WATER AND PHYTOPLANKTON IN MONTEREY BAY, CALIFORNIA,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 02K.
W74-00829

CHANGES IN THE CONCENTRATION OF SOLUBLE AND PARTICULATE IRON IN SEAWATER ENCLOSED IN CONTAINERS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02K.
W74-00830

CURRENT PRACTICE IN GC-MS ANALYSIS OF ORGANICS IN WATER,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
R. G. Webb, A. W. Garrison, L. H. Keith, and J. M. McGuire.
Copy available from GPO Sup Doc as EP1.23/2:73-277, $1.25; microfiche from NTIS as PB-224 947/2, $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-277, August 1973. 91 p, 16 fig, 6 tab, 26 ref. EPA Project 16020 GHP.

Descriptors: *Pollutant identification, *Water sampling, *Solvent extractions, *Gas chromatography, *Mass spectrometry, Industrial wastes, Organic wastes, Data storage and retrieval, Water pollution sources, Water chemistry.
Identifiers: Waste identification, Derivative formation, Clean-up, Case histories, Kuderna-Danish Evaporator.

Experiences during five years of evaluating the application of gas chromatography-mass spectrometry (GC-MS) to wastewater analysis at the Southeast Environmental Research Laboratory have resulted in the selection of recommended practices for such applications. Liquid-liquid extraction with solvents such as methylene chloride and chloroform removed greater than 50 percent of compounds found in pulp mill and petrochemical waste at concentrations of 2 microgram/l to 20 microgram/l. The Kuderna-Danish evaporator was the most effective means of concentration after extraction. Diazomethane and dimethyl sulfate proved to be the most effective of five methylation reagents studied. Packed columns were effective for gas chromatography of simple mixtures and SCOT columns provided better overall performance for complex mixtures. Computerized data reduction was essential for practical use of GC-MS for samples containing many compounds. A computerized spectra matching program proved highly effective in identifying compounds contained in the computer library. The system was shown to be effective in solving problems related to fishkills caused by pesticides, confirmation of polychlorinated biphenyl residues in water and identification of compounds discharged by over a dozen industries. Over two hundred compounds were identified in industrial effluents. (EPA)
W74-00834

HYDROCHEMICAL ZONALITY OF URAL LAKES (GIDROKHIMICHESKAYA ZONAL'NOST' OZER URALA),
For primary bibliographic entry see Field 02H.
W74-00840

INTERACTION OF NITRILOTRIACETIC ACID WITH SUSPENDED AND BOTTOM MATERIAL.
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.

Copy available from GPO Sup Doc as EP-1.16:16020 GFR 07/71, $0.45; microfiche from NTIS as PB-225 023/1, $1.45. Environmental Protection Agency, Water Pollution Control Research Series, July 1971. 31 p, 12 tab, 8 ref.

Descriptors: *Detergents, *Absorption, Analytical Techniques, Neutron Activation Analysis, *Nitrilotriacetic acid, *Pollutant identification, Trace elements, *Bottom sediments, Suspended solids, Sediments, Metals.

An experimental investigation was made of the possible interaction of residual concentrations of nitrilotriacetic acid in surface waters with metallic elements contained in sediments and bottom materials. Samples of bottom materials from typical bodies of surface waters were analyzed for their major, minor, and trace constituents. Eight representative samples of these were equilibrated with distilled water and with water containing 20 ppm of NTA and the resulting solutions were analyzed by three analytical techniques. Elements showing essentially no increased solubility in the presence of NTA were: barium, antimony, molybdenum, strontium, chromium, silver, tin, iron, lead, cadmium, copper, and mercury. Elements showing small increases in solubility were: nickel, zinc, manganese, and cobalt. Calcium and magnesium concentrations. (EPA)
W74-00926

SOME SIMPLE METHODS FOR LIMNOLOGICAL STUDY IN SHALLOW WATER,
Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 07B.
W74-00998

COMPARISON OF 2 METHODS OF TREATING WATER SAMPLES ('ACTUAL IN SITU' AND 'SIMULATED IN SITU') FOR STUDY OF PRIMARY PRODUCTION BY THE CARBON 14 TECHNIQUE (IN FRENCH),
For primary bibliographic entry see Field 07B.
W74-01004

CONCERNING A NEW GRAPHIC METHOD FOR STUDY OF NATURAL WATERS (IN FRENCH),
Institut National des Sciences Appliquees, Toulouse (France).
For primary bibliographic entry see Field 02K.
W74-01008

TIME-TABLES AS A METHOD TO RECORD CHANGES IN PLANKTON COMPOSITION,
Research and Advisory Inst. for Field Crop and Grassland Husbandry, Wageningen (Netherlands).
For primary bibliographic entry see Field 07B.
W74-01010

STREAM AND LAKEFRONT FIELD INVENTORY, VOLUME I - SUMMARY.
Lorain County Regional Planning Commission, Elyria, Ohio.
For primary bibliographic entry see Field 05B.
W74-01046

THE VECTOR OF SAPROBITY AND THE SYSTEM OF WATER QUALITY,
Vysoka Skola Chemicko-Technologicka, Prague (Czechoslovakia). Dept. of Water Technology.
V. Sladecek.
Pol Arch Hydrobiol. Vol 19, No 2, p 211-213, 1972. Illus.
Identifiers: *Saprobity vector, *Water quality, *Indicators.

A modification of Golowin's (1968) vector of saprobity was proposed for the general scheme of water quality. All 5 limnosaprobic as well as 4 eusaprobic degrees were included in the half circle. The vector of saprobity played the role of indicator.--Copyright 1973, Biological Abstracts, Inc.
W74-01074

SELECTED WATER-QUALITY RECORDS FOR TEXAS SURFACE WATERS, 1971 WATER YEAR,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01086

WATER QUALITY ASSESSMENT PRACTICE IN AUSTRALIA,
Melbourne Water Science Inst. (Australia).

For primary bibliographic entry see Field 02K.
W74-01089

THE DEVELOPMENT AND PRELIMINARY APPLICATION OF AN INVARIANT COUPLED DIFFUSION AND CHEMISTRY MODEL,
Aeronautics Research Associates of Princeton, Inc., N.J.
G. R. Hilst, C. D. Donaldson, M. Teske, R. Contiliano, and J. Freiberg.
Available from NTIS, Springfield, Va. 22151 NASA CR-2295 Price $3.75 ($6.25 foreign) printed copy; $1.45 microfiche. National Aeronatics and Space Administration Contractor Report NASA CR-2295, September 1973. 82 p, 25 fig, 2 tab, 2 append. NASA Contract NAS1-11433.

Descriptors: *Atmosphere, *Aircraft, *Fallout, Chemical reactions, Model studies, Turbulent flow, Winds, Ozone, Diffusion, Kinetics, *Air pollution.
Identifiers: *Aircraft exhaust, Stratospheric wake.

The development of invariant models (second-order closure) of diffusion and chemical reactions in turbulent air flow system is described. One of the objectives has been to provide guidance for the design of a possible NASA program for in situ measurements of SST exhaust products at cruise altitudes (about 20 km) and, eventually, to use the models for data analysis and interpretation. An approximate closure scheme for a chemical kinetic submodel which conforms to the principles of invariant modeling and which accounts for the effects of inhomogeneous mixing over a wide range of conditions has been developed. This submodel has been coupled successfully with invariant turbulence and diffusion of two reacting (isothermally) chemical species. The initial calculations indicate the ozone reactions in the wake of stratospheric aircraft will be substantially affected by the rate of diffusion of ozone into the wake, and in the early wake, by unmixedness. (Woodard-USGS)
W74-01095

5B. Sources of Pollution

A EUTROPHICATION MODEL OF THE WHITE RIVER BASIN ABOVE BEAVER RESERVOIR IN NORTHWEST ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W74-00555

TRAVEL TIME OF GEORGIA STREAMS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 04A.
W74-00556

GROUND WATER, A RESOURCE TO BE PROTECTED,
Minnesota Dept. of Natural Resources, St. Paul.
R. L. Herbst.
In: Proceedings of Conference on Toward a Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 8-10, February 1973. 14-31-0001-3823.

Descriptors: *Water resources development, *Water pollution control, *Groundwater, *Minnesota, Conferences, Water management (Applied), Data collections, Hydrologic data, Hydrogeology, Information exchange.

In the next few years, critical water resource decisions must be made in Minnesota. The availability and occurrence of water and the present and future water needs must be determined in sufficient detail to provide guidance to policy objectives. Policies must be implemented through a coordinated effort of all levels of government. The legal framework necessary for the management of water resources must be built. Responsibilities for the management, development, and coordination of State water programs must be specified within a simplified framework. (See also W73-09113) (Knapp-USGS)
W74-00566

THE NATIONAL QUALITY OF GROUND WATER IN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 02F.
W74-00567

THE USE OF GROUNDWATER IN MINNESOTA,
Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
For primary bibliographic entry see Field 04B.
W74-00568

HYDROGEOLOGIC FRAMEWORK FOR DETERIORATION IN GROUNDWATER QUALITY,
Minnesota Univ., St. Paul. Dept. of Geology and Geophysics.
H. O. Pfannkuch, and P. K. Saint.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 35-58, February 1973. 6 fig, 8 ref. 14-31-0001-3823.

Descriptors: *Path of pollutants, *Groundwater movement, *Water chemistry, Minnesota, Monitoring, Underground waste disposal, Waste disposal wells, Water pollution sources, Water pollution effects.

The chemical quality of groundwater will reflect the geochemical material it has been in contact with, the path it has followed underground, the residence time spent in the subsurface, and the initial quality of the water upon entering the aquifer system. In much the same way the system interacts with manmade contaminatns. It is, however, subjected to chemical and hydrologic stresses that may go beyond the self-regulatory capacities of the system and cause irreversible damages. The two principal processes that bear on groundwater quality deterioration are hydraulic transport and dispersion which physically moves contaminants into and through the groundwater reservoir, and physicochemical reactions. A small source of highly concentrated contaminants can pollute very large quantities of groundwater. The effect of the reaction processes is in general that of decontamination and purification of waste water. The purifying capabilities have to be known in order to properly assess the role of the underground in determining water quality. The main processes occurring are mechanical filtration, sorption, ion exchange, oxidation, biochemical stabilization and microbial decomposition, chemical precipitation and coprecipitation as well as gas exchange. Proper planning and management are needed to prevent or minimize deterioration. Once an understanding of the workings of the system has been obtained and certain social, environmental and economic goals have been incorporated into a management plan, it becomes necessary to monitor the system to see whether objectives are met. (See also W73-09113) (Knapp-USGS)
W74-00569

GROUND WATER POLLUTION PROBLEMS IN MINNESOTA,
Minnesota Pollution Control Agency, Minneapolis. Div. of Water Quality.
D. Wikre.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality InformationSystem and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 59-78, February 1973, 9 fig, 12 ref. 14-31-0001-3823.

Descriptors: *Water pollution sources, *Groundwater, *Minnesota, *Path of pollutants, Groundwater movement, Sewage disposal, Waste water disposal, Water pollution control.

One of Minnesota's most important and abundant natural resources is its high quality water, both surface and underground. In recent years there has been a great deal of concern over the deteriorating quality of lakes and rivers. Problems involving municipal and industrial discharges are continually in the news. Large sums of money are being spent to clean up and protect the State's surface waters. During the same period, concern for groundwater quality has been increasing but at a slower rate. This may be because there are a smaller number of groundwater pollution problems in Minnesota. However, the main reason for lack of concern is the fact that the pollution is not visible. After the contamination has entered the ground, it may go undetected for years, until it appears in wells some distance from the original point of contamination. Most groundwater pollution problems can be grouped into six classes. These are problems resulting from individual sewage disposal systems, from agricultural practices, from municipal waste disposal practices, industrial waste disposal practices, petroleum products spills and leaks, and from the use of disposal wells. (See also W73-09113) (Knapp-USGS)
W74-00570

ESTABLISHING THE IMPACT OF AGRICULTURAL PRACTICES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. Dept. of Soil.
R. G. Gast, and P. R. Goodrich.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 79-91, February 1973. 1 fig, 4 tab, 9 ref. 14-31-0001-3823.

Descriptors: *Water pollution sources, *Groundwater, *Farm wastes, *Fertilizers, Nitrogen, Water quality, Nitrates, Water pollution.
Identifiers: Groundwater pollution.

Agricultural croplands constitute about 35% of the total land area of the State of Minnesota and consequently overlay extensive groundwater reserves. Agricultural practices on these lands often involve application of large quantities of herbicides, pesticides, and nitrogen, phosphorus and potassium in fertilizers and animal wastes which pose potential threats to groundwater quality. All of these materials except nitrogen are strongly absorbed by the soil and pose little threat to groundwaters. Nitrogen (as nitrate) is mobile and will move into groundwaters if allowed to accumulate in the soil. Optimum crop yields can be sustained without nitrate accumulations in the soil if proper fertilization rates are used. If animal wastes are concentrated in a small area, they may move almost directly into the groundwater by such mechanisms as sinkholes and defective well casings or by saturated flow through soils. Contamination of groundwaters from such sources can be minimized by locating larger operations con-

sistent with proper soil and hydrologic conditions. (See also W73-09113) (Knapp-USGS)
W74-00571

NEEDS AND USES FOR A GROUND WATER QUALITY DATA SYSTEM,
Minnesota Univ., St. Paul. Agricultural Extension Service.
For primary bibliographic entry see Field 07A.
W74-00573

WATER WELL RECORDS AND INFORMATION SYSTEM NEEDS,
Minnesota Dept. of Health, Minneapolis. Div. of Environmental Health.
For primary bibliographic entry see Field 07C.
W74-00574

SUBSURFACE GEOLOGIC INFORMATION SYSTEM IN MINNESOTA: A STATUS REPORT,
Geological Survey, Minneapolis, Minn.
For primary bibliographic entry see Field 07C.
W74-00575

GROUND WATER QUALITY INFORMATION SYSTEMS - EXPERIENCES IN OTHER STATES,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 07C.
W74-00576

UTAH'S GROUND WATER QUALITY INFORMATION SYSTEM,
Utah State Div. of Health, Salt Lake City.
For primary bibliographic entry see Field 07C.
W74-00577

FEDERAL WATER INFORMATION SYSTEMS,
Geological Survey, Washington, D.C. Office of Water Data Coordination.
For primary bibliographic entry see Field 07C.
W74-00578

RELATION OF GROUND WATER QUALITY INFORMATION SYSTEM AND OTHER SYSTEMS IN MINNESOTA,
Minnesota State Planning Agency, St. Paul.
For primary bibliographic entry see Field 07C.
W74-00579

PROPAGATION OF SINUSOIDAL SOLUTE DENSITY OSCILLATIONS IN THE MOBILE AND STAGNANT PHASES OF A SOIL,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-00604

DISSOLVED ALUMINUM IN ACID SULFATE SOILS AND ACID MINE WATERS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soil and Science and Geology.
N. Van Breemen.
Soil Science Society of America Proceedings, Vol 37, No 5, p 694-697, September-October 1973. 2 fig, 1 tab, 16 ref.

Descriptors: *Sulfates, *Acid mine water, *Soil chemistry, Aluminum, Hydrogen ion concentration, Water pollution effects, Water pollution sources, Acidic soils, Saline soils.

Analytical data on water samples from acid sulfate soils and acid mine spoils indicate that the upper limit of dissolved Al is regulated by a basic aluminum sulfate with the stoichiometric composition AlOHSO4. The observed solubility relationship, pAl + pOH + pSO4 ± 17.23, can be useful in defining environmental conditions in terms of pH and dissolved sulfate for the occurrence of Al concentrations toxic to plants. (Knapp-USGS)
W74-00607

SALTS IN IRRIGATION DRAINAGE WATERS: I. EFFECTS OF IRRIGATION WATER COMPOSITION, LEACHING FRACTION, AND TIME YEAR ON THE SALT COMPOSITIONS OF IRRIGATION DRAINAGE WATERS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 04C.
W74-00609

BIOMAGNIFICATION OF P,P'-DDT AND METHOXYCHLOR BY BACTERIA,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
B. T. Johnson, and J. O. Kennedy.
Applied Microbiology, Vol 26, No 1, p 66-71, July 1973. 3 fig, 3 tab, 19 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, Aquatic bacteria, Radioactivity techniques, Soil bacteria, Pesticide residues, Biomass, Insecticides, *DDT, Aerobic bacteria, Anaerobic bacteria.
Identifiers: *Biological mangification, p p' DDT, *Methoxychlor, *Bacillus subtilis, *Aerobacter aerogenes, Bioaccumulation, Chemical recovery.

Strains of Aerobacter aerogenes and Bacillus subtilis were exposed to 1 ppm C-14-labeled DDT or methoxychlor in distilled water to determine uptake kinetics and retention of the pesticides. The bacteria accumulated p,p'-DDT and methoxchlor directly from water. Uptake of both C-14-labeled organochlorine insecticides was rapid; 80 to 90 percent of the 24-h residues were reached with 30 min. Total cellular residues varied linearly with concentrations of DDT and methoxychlor in water ranging from 0.5 to 5.0 micrograms/liter. The residue magnification factors from water were between 1,400- to 4,300-fold, but were independent of insecticide concentrations in water. When the insecticide-exposed microbial cells were washed with pesticide-free water, DDT residues were 45 percent in A. aerogenes and 30 percent in B. subtilis, whereas the methoxychlor level decreased nearly 75 percent in both organisms. Subsequent washing did not further reduce the insecticide residue. Autoclave-killed bacteria also rapidly adsorbed DDT and methoxychlor from water and, in some instances, residues were higher than in the living cells. Molecular polarity and lipid solubility appear to influence the retention of the organochlorine insecticides by bacterial cells. (Holoman-Battelle)
W74-00615

BACTERIAL ENDOTOXINS IN THE ENVIRONMENT,
Tulane Univ., New Orleans, La. Dept. of Physiology.
N. R. Di Luzio, and T. J. Friendmann.
Nature, Vol 244, No 5410, p 49-51, July 6, 1973. 1 tab, 23 ref.

Descriptors: *Ecological distribution, *Potable water, Environment, *Cities, *Municipal water, Milk, Natural streams, Saline water, Surface waters, Artesian wells, Sodium chloride, Aqueous solutions, Toxins, Aquatic environment, Gulf of Mexico, Mississippi River, Deep water, Potomac River, Colorado River, Lake Michigan.
Identifiers: *Beverages, Biological fluids, *Bacterial endotoxins, Distilled water, Pure water, Dextrose, Baltimore, Chicago, Denver, Galveston, Harrisburg, Hazelton, Kalamazoo, Knoxville, Las Vegas, Little Rock, Los Angeles, Memphis, Mobile, Nashville, New Orleans Riverside, San Francisco, Washington, D.C., Barataria Bay, Little Dauphin Island Bay, Fort Loudoun Lake, Mexico City, Cumberland River, South Platte River, Bear Creek, Hetchy Reservoir, Lake Mead, Lake Maumelle, Lake Winnoa, Mammouth Lake.

Studies were conducted to compare the Gram negative endotoxin content of New Orleans water with that of other cities, as well as the endotoxin distribution in various beverages and biological fluids. Tap water was obtained from various cities and placed in sterile vials. The lysate used was E-Toxate; studies were also carried out with lysate prepared in the laboratory. Samples from cities such as Memphis and Kalamazoo, which derive their water from Artesian wells, were consistently negative. Galveston was an exception to this group. Samples from all other sources were positive. To determine the actual concentrations of endotoxins, samples were serially diluted and duplicate determinations carried out. Tap water in New Orleans and Mobile contained 1 microgram/ml endotoxin compared with 10 micrograms/ml in Denver and San Francisco samples. Surface water samples from the Mississippi River at New Orleans contained 128 micrograms endotoxin per ml whereas samples from deep levels (the source of tap water) contained approximately 400 micrograms/ml. A sample of water from the Gulf of Mexico contained 400 micrograms/ml endotoxin whereas samples from bays off the coast of Louisiana and Alabama contained only 20 micrograms/ml. Tests carried out on biological fluids and beverages showed that chemically pure water, 5 percent dextrose, and sodium chloride solutions were negative for endotoxin. Random samples of beer, cola drinks and wine were also negative. One sample of locally obtained commercial bottled water was positive, but another brand, derived from a 2,000 foot deep Artesian well, was negative. In contrast, Mexico City tap water had an endotoxin content of 800 micrograms/ml. Endotoxin was also found in milk samples from New Orleans. The range was 30 to 130 micrograms/ml. The endotoxin content rose sixteen-fold when milk was maintained at room temperature for 24 h with concomitant bacterial proliferation. No endotoxin alteration was observed when the samples were refrigerated. (Holoman-Battelle)
W74-00618

CONDITION OF COLIFORM ORGANISMS INFLUENCING RECOVERY OF SUBCULTURES ON SELECTIVE MEDIA,
Nebraska Univ., Lincoln. Dept. of Food Science and Technology.
R. B. Maxcy.
Journal of Milk and Food Technology, Vol 36, No 8, p 414-416, August 1973. 1 tab, 13 ref.

Descriptors: *E. coli, *Heat resistance, *Stress, Radiation, Sodium chloride, Bioindicators, Coliforms, Sewage bacteria, Cultures, Sewage, Public health.
Identifiers: *Sensitivity, *Selective media, Enrichment, Differential media, Culture media, Enterobacter aerogenes.

The purpose was to determine whether stress treatments, such as are encoutered in food processing, influence subsequent cultures of coliforms and to study the conditions required for the progeny to regain normal resistance to selective components of media. Enterobacter aerogenes and one strain of E. coli from a culture collection were subjected to heat, radiation, and sodium chloride after which they were grown on plating media. Colonies were then randomly picked and grown in nutrient broth for further comparison of their ability to form colonies on plate count and violet red bile agar. After 6 hr in nutrient broth, average counts on violet red bile agar were less than half those obtained with plate count agar. Sensitivity to the selective medium was lost by repeated transfer and growth in nutrient broth or by repeated picking from the selective medium and subculture of colonies. Cultures with moderate sensitivity to violet red bile

agar were obtained from raw sewage through picking of colonies from plate count agar. Attempts to obtain a stable sensitive strain through selective enrichment were unsuccessful. A laboratory strain of E. coli, with extreme sensitivity to violet red bile agar, however, was used to determine that tolerance was acquired by stepwise adaptation to a selective medium. Occurrence of sensitive coliform cells in nature indicates their potential importance in tests for indicator organisms of public health significance. (Little-Battelle)
W74-00621

MOLECULAR RELATIONSHIPS AMONG THE SALMONELLEAE,
Walter Reed Army Inst. of Research, Washington, D.C.
J. H. Crosa, D. J. Brenner, W. H. Ewing, and S. Falkow.
Journal of Bacteriology, Vol 115, No 1, p 307-315, July 1973. 3 fig, 4 tab, 23 ref.

Descriptors: *Salmonella, *Enteric bacteria, *Pollutant identification, Biological properties, Classification, Cytological studies, Radioactivity techniques, Aerobic bacteria, E. coli, Proteins, Systematics.
Identifiers: *Deoxyribonucleic acid, *Genome, *Chemotaxonomy, Biochemical characteristics, Polynucleotide sequences, Culture media, Proteus mirabilis, Arizona.

Polynucleotide sequence relatedness studies were carried out to determine the extent of divergence present in members of the tribe Salmonelleae and between salmonellae and other enteric bacteria. Cultures of bacteria were maintained on meat extract of nutrient agar slants. Brain-heart-infusion broth (Difco) was used for routine cultivation of organisms on a dry air rotary shaker at 37 C. For labeling DNA, log-phase cells were suspended in a tris (hydroxymethyl) aminomethane-glucose medium lacking phosphate salts and containing 0.05 percent brain-heart-infusion broth. Carrier-free H3P-3204 (10-15 mCi) was added, and the cultures were incubated at 37C with shaking for 16 to 18 h. Both labeled and unlabeled deoxyribonucleic acid (DNA) were prepared by a modification of the method of Berns and Thomas (1969). The estimation of the genome sizes in test organisms was accomplished essentially as described by Gillis, et al. with some modifications. Typical Salmonella were 85 to 100 percent related. Two groups of biochemically atypical Salmonella showed somewhat lower binding to typical salmonellae and to each other. Arizona were 70 to 80 percent related to salmonelleae. Two groups of Arizona were detected. These groups correlated with the presence of monophasic or diphasic flagellar antigens. Salmonella and Arizona were no more related to Citrobacter than to Escherichia coli (45-55 percent). Relatedness of Salmonella and Arizona to other enterobacteria ranged from 20 to 40 percent with klebsiellae and shigellae, to 20 to 25 percent with erwiniae, and to less than 20 percent with edwardsiellae and Proteus mirabilis. (Holoman-Battelle)
W74-00623

FACTORS WHICH INFLUENCE THE ENUMERATION OF BDELLOVIBRIO BACTERIOVORUS IN SEWAGE AND RIVER WATER,
University of Wales Inst. of Science and Tech., Cardiff.
For primary bibliographic entry see Field 05A.
W74-00624

OXIDATION OF POLYCHLORINATED BIPHENYLS BY ACHROMOBACTER PCB,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
M. Ahmed, and D. D. Focht.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 2, p 70-72, August 1973. 2 fig, 1 tab, 2 ref.

Descriptors: *Oxidation, *Polychlorinated biphenyls, *Microbial degradation, Metabolism, Cultures, Manometers.
Identifiers: *Achromobacter, Dechlorination, Biotransformation, Fate of pollutants.

Resting cell suspensions of Achromobater pCB, which were grown on PCB, were used in tests to determine their ability to metabolize 2,3-DCB, 2,4-DCB, 3,4-DCB, 3,5-DCB, 3,3'-DCB, 3,4,2'-TCB, 2,3,2',3'-TCB, 2,5,3',4'-TCB, and 2,3,4,5,6-PCB. Rates of metabolism were determined manometrically. All compounds except 2,5,3',4'-TCB were oxidized by the organisms. Spectrophotometric analysis of supernatant solutions revealed no chlorides indicating that the organism was unable to dehalogenate the compounds. (Little-Battelle)
W74-00632

MONITORING OF DUMPING BY MEANS OF SATELLITE REMOTE SENSING,
Environmental Research Inst. of Michigan, Ann Arbor.
C. T. Wezernak, and F. J. Thomson.
AMBIO, Vol 2, No 3, p 84-86, 1973. 5 fig, 6 ref.

Descriptors: *Remote sensing, *Monitoring, *Oceans, *Waste disposal, Suspended solids, Sewage sludge, Acidic water, Data processing.
Identifiers: *ERTS, Data interpretation, Multispectral scanner.

Data from the Earth Resources Technology Satellite (ERTS) have been analyzed to evaluate the feasibility of monitoring waste disposal in the oceans. A multispectral aircraft mission was also included to corroborate the results obtained from the ERTS data. ERTS data were obtained at four spectral bands from 0.5 to 1.1 micrometers and clearly show that sewage sludge, acid waste, suspended solids, and major water mass boundaries are observable. The relative depths and dimensions of the waste and dispersal patterns can be determined from the data. It is concluded that satellite remote sensing of large scale events such as ocean dumping is a potential monitoring technique. (Little-Battelle)
W74-00635

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION OF FRESHWATER ALGAE: AN EXPERIMENTAL STUDY. II. THE ROLE OF PH AND THE CARBON DIOXIDE-BICARBONATE SYSTEM,
Michigan State Univ., East Lansing. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00639

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION OF FRESHWATER ALGAE: AN EXPERIMENTAL STUDY. III. EFFECTS OF TEMPERATURE, VITAMIN REQUIREMENTS AND INORGANIC NITROGEN COMPOUNDS ON GROWTH,
Michigan State Univ., East Lansing. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00640

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION OF FRESHWATER ALGAE: AN EXPERIMENTAL STUDY. IV. GROWTH OF TEST SPECIES IN NATURAL LAKE WATERS, AND CONCLUSION,
Michigan State Univ., East Lansing. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00641

BIODEGRADATION OF NITRILOTRIACETATE (NTA) BY BACTERIA-I. ISOLATION OF BACTERIA ABLE TO GROW ANAEROBICALLY WITH NTA AS A SOLE CARBON SOURCE,
Karolinska Institutet, Stockholm (Sweden). Dept. of Applied Microbilogy.
For primary bibliographic entry see Field 05A.
W74-00644

BIODEGRADATION OF NITRILOTRIACETATE (NTA) BY BACTERIA--II. CULTIVATION OF AN NTA-DEGRADING BACTERIUM IN ANAEROBIC MEDIUM,
Karolinska Institutet, Stockholm (Sweden). Dept. of Applied Microbiology.
S-O. Enfors, and N. Molin.
Water Research, Vol 7, No 6, p 889-893, June 1973. 3 fig, 3 ref.

Descriptors: *Anaerobic bacteria, *Microbial degradation, *Anaerobic conditions, *Aerobic conditions, Cultures, Nitrates, Nutrient requirements, Nitrites, Isolation, Biodegradation, Nitrilotriacetic acid, Hydrogen ion concentration, Oxidation-reduction potential, Dissolved oxygen, Cultivation.
Identifiers: Substrate utilization, *Culture media, *Degradation rates, Selective media, Characterization, Bacterial physiology.

A nitrilotriacetate (NTA) degrading bacterium which can grow in a salt medium with NTA as the sole carbon source has been cultivated aerobically and anaerobically in a fermentor. The organism needs nitrate for anaerobic growth. The degradation rate is very low during an adaption phase of 40-80 h after onset of anaerobic conditions, but after this the degradation rate increases. Degradation of NTA is accompanied by a pH increase but the cell density increases less than could be expected from the amount of NTA consumed. Traces of nitrite are produced and the concentration reaches a peak when the conditions are changed from aerobic to anaerobic. (See also W74-00644) (Holoman-Battelle)
W74-00645

EFFECT OF TEMPERATURE OF INCUBATION ON PERFORMANCE OF MEDIA IN THE DETECTION OF ENTERIC PATHOGENS,
East Jefferson General Hospital, Metairie, La.
For primary bibliographic entry see Field 05A.
W74-00646

THE STANDING CROP AND PRIMARY PRODUCTIVITY OF THE PHYTOPLANKTON OF ABBOT'S POND, NORTH SOMERSET,
Bristol Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-00651

MICROBIOLOGICAL EVALUATION OF COLD-WATER SHRIMP (PANDALUS BOREALIS),
Food and Drug Administration, Boston, Mass.
For primary bibliographic entry see Field 05A.
W74-00653

MICROBIAL FORMATION OF NITROSAMINES IN VITRO,
Cornell Univ., Ithaca, N.Y. Lab. of Soil Microbiology.
A. Ayanaba, and M. Alexander.
Applied Microbiology, Vol 25, No 6, p 862-868, June 1973. 2 fig, 4 tab, 24 ref.

Descriptors: *Yeasts, *Fungi, *Bacteria, *Nitrites, *Nitrates, *Cultures, Enzymes, Microbial degradation, E. coli, Bioassay, Pseudomonas.
Identifiers: Biosynthesis, *Nitrosamines, Aerobacter aerogenes, Proteus vulgaris,

Streptococcus epidermidis, Bacillus subtilis, Arthrobacter, Nocardia, Aspergillus niger, Aspergillus oryzae, Montierella parvispora, Zygorhynchus moelleri, Trimethylamine, Dimethylamine, N-nitrosodiphenylamine, Diphenylamine, Dialkylamines, Dimethylnitrosamine, Cryptococcus.

Several microorganisms (Aerobacter aerogenes, Proteus vulgaris, Streptococcus epidermidis, Bacillus subtilis, E. coli, Arthrobacter sp., Nocardia sp., Cryptococcus sp., Pseudomonas sp., Aspergillus niger, Aspergillus oryzae, Mortierella parvispora, and Zygorhynchus moelleri) were isolated from garden soil, cow manure, lake water, and municipal sewage for use in experiments to demonstrate the biosynthesis of nitrosamines under conditions where only biological nitrosation could occur. M. parvispora and an unidentified bacterium converted trimethylamine to dimethylamine, and the bacterium (but not the fungus) formed dimethylnitrosamine in the presence of nitrite. Dimethylnitrosamine also appeared in cell suspension of E. coli and S. epidermidis and in hyphal mats of A. oryzae incubated with dimethylamine and nitrate. Suspensions of a number of microorganisms produced N-nitrosodiphenylamine from diphenylamine and diphenylamine and nitrite at pH 7.5, and soluble enzymes catalyzing the N-nitrosation of diphenylamine were obtained from two of these organisms. In the presence of these enzymes, several dialkylamines were converted to the corresponding N-nitroso compounds. (Little-Battelle)
W74-00654

NEGATIVE CHEMOTAXIS OF MARINE BACTERIA TO TOXIC CHEMICALS,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
For primary bibliographic entry see Field 05C.
W74-00658

UTILIZATION OF IRON GALLATE AND OTHER ORGANIC IRON COMPLEXES BY BACTERIA FROM WATER SUPPLIES,
Queensland Univ., Brisbane (Australia). Dept. of Microbiology.
I. C. Mac Rae, J. F. Edwards, and N. Davis.
Applied Microbiology, Vol 25, No 6, p 991-995, June 1973. 1 fig, 4 tab, 7 ref.

Descriptors: *Aquatic bacteria, *Microbial degradation, Water supply, Cultures, Biodegradation, Surface waters, Iron, Isolation, Organic compounds, Pseudomonas, Electron microscopy.
Identifiers: *Fate of pollutants, *Substrate utilization, *Organic iron compounds, Iron gallate, Organometallics, Ferric malonate, Ferric malate, Gallic acid, Ferric ammonium citrate, Alcaligenes, Acinetobacter, Vibrio, Moraxella, Culture media, Metal complexes.

The degradation of four soluble organic iron compounds by bacteria isolated from surface waters and the precipitation of iron from these complexes by the isolates was studied. All eight isolates brought about the precipitation of iron when grown on ferric ammonium citrate agar. Three isolates were able to degrade ferric malonate, and three others degraded ferric malate with iron precipitation. Only three isolates, two strains of Pseudomonas and one of Moraxella, were able to degrade gallic acid when this was supplied as the sole carbon source. One strain of Pseudomonas was found to be active in degrading ferric gallate. Electron microscopy of cells of this bacterium after growth in ferric gallate as the sole carbon source yielded results indicating uniform deposition of the iron on or in the bacterial cells. Seven of the isolates could degrade the iron gallate complex if supplied with additional carbon in the form of yeast extract. (Holoman-Battelle)
W74-00660

A COMPARISON OF THE DISTRIBUTION OF INTESTINAL BACTERIA IN BRITISH AND EAST AFRICAN WATER SOURCES,
Newcastle-upon-Tyne Univ. (England). Dept. of Civil Engineering.
L. M. Evison, and A. James.
Journal of Applied Bacteriology, Vol 36, No 1, p 109-118, March 1973. 7 tab, 23 ref.

Descriptors: *Enteric bacteria, *Pathogenic bacteria, *Ecological distribution, Water pollution, Bioindicators, Pollutant identification, Sewage effluents, Soils, Aerobic bacteria, E. Coli, Coliforms, Soil environment, Vegetation, Aquatic environment, Domestic wastes, Milk, Farm wastes, Sewage treatment, Africa, Water temperature.
Identifiers: *Kenya, *England, Culture media, Serotypes, Fecal streptococci, Lactobacillus spp, Salmonella spp, Enumeration, Klebsiella spp, Yogurt, Citrobacter freundii, Klebsiella aerogenes, Proteus spp, Survival.

Vrious workers have suggested that there are marked regional variations in the distribution of intestinal bacteria used as indicators of pollution in water supplies. Results are presented of investigations into the distribution of some intestinal indicators (coliforms, Escherichia coli, faecal streptococci and anaerobic lactobacilli) in water sources in the United Kingdom and in Kenya. The surveys showed that the differences in distribution were not significant except for some coliforms (Citrobacter and Klebsiella spp.), but that survival subsequent to excretion was affected by ambient temperature. (Holoman-Battelle)
W74-00662

A MEDIUM FOR COUNTING AQUATIC HETEROTROPHIC BACTERIA IN POLLUTED AND UNPOLLUTED WATERS,
University of Wales Inst. of Science and Tech., Cardiff.
D. G. Staples, and J. C. Fry.
Journal of Applied Bacteriology, Vol 36, No 1, p 179-181, March 1973. 1 tab, 12 ref.

Descriptors: *Aquatic bacteria, *Pollutant identification, *Sewage effluents, Water pollution, Natural streams, Cultures, Pollutants, Water sampling, Lakes, Rivers.
Identifiers: *Counting, *Heterotrophic bacteria, *Casein peptone starch medium, Culture media, Culturing techniques, River Kenson, River Ely, Nutrient agar, Plate counts, Sodium caseinate, Yeast extract, Iron peptone, River water agar, Sewage extract agar.

Casein-peptone-starch (CPS) medium was compared with 8 other media for counting heterotrophic bacteria in polluted and unpolluted surface waters. Samples were taken in sterile glass bottles, shaken 20 times, diluted with sterile river water, and appropriate dilutions were plated in triplicate by the spread plate techniques. The plates were incubated at 20 degrees for 10 days; colonies were counted on plates showing 30-300 colonies/plate. The results confirm that for clean and polluted rivers CPS is more suitable for counting freshwater bacteria than are the recommended media, including that of the American Public Health Association (1965). (Holoman-Battelle)
W74-00663

DEGRADATION OF CHLORINATED HYDROCARBONS BY CLOSTRIDIUM SP. ISOLATED FROM LINDANE-AMENDED, FLOODED SOIL,
Central Rice Research Inst., Cuttack (India).
N. Sethunathan, and T. Yoshida.
Plant and Soil, Vol 38, No 3, p 663-666, June 1973. 2 tab, 7 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Clostridium, *Soil bacteria, *Microbial degradation, Soil contamination, Insecticides, Anaerobic bacteria, Isolation, Biodegradation, Heptachlor, Radioactivity techniques, Anaerobic conditions.
Identifiers: *Lindane, *Flooded soil, Flooded conditions, Methoxychlor, Degradation products.

A Clostridium sp., isolated from flooded soil amended with lindane (gamma-BHC), decomposed methoxychlor, gamma-BHC and heptachlor in that order under anaerobic condition. During the bacterial degradation of ring-labelled C-14-gamma-BHC, there was a net loss of radioactivity from the reaction mixture. Release of C1402 during the degradation of C-14-gamma-BHC was negligible. Methane was not detected as an end product of gamma-BHC breakdown. (Holloman-Battelle)
W74-00664

INTERMEDIA ASPECTS OF AIR AND WATER POLLUTION CONTROL,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
R. Stone, and H. Smallwood.
Copy available from GPO Sup Doc as EP1.23 600-73-003, $3.25; microfiche from NTIS as PB-224 812, $1.45. Environmental Protection Agency, Socioeconomic Studies Series, Report EPA-600/5-73-003, August 1973. 356 p, 30 fig, 51 tab, 411 ref. EPA Program Element 1H1093, 68-01-0729.

Descriptors: *Water pollution, *Air pollution, Water pollution control, Water pollution sources, California, *Path of pollutants, Costs, Waste disposal, Waste water treatment, *Air-water interfaces.
Identifiers: *Intermedia pollution control, Intermedia transfer.

Current National intermedia pollutants (air, water, and residues) and strategies for their control were evaluated. Major intermedia pollutants in both air and water were identified. The principal sources of direct intermedia pollutant transfer were identified as incineration, wastewater processing, NO from water chlorination, sludge processing, release of radioactive gases (water-to-air): scrubbers, cleaning equipment, and regeneration of activated carbon (air-to-water). Indirect sources were identified as replacement of fossil fuel by nuclear energy, wastes generated by pollution-control equipment manufacture, and water recycling. Residue disposal problems were found to include landfill gas and leachate contamination, limited disposal sites, and increasing costs. Techniques of controlling intermedia pollutant transfer were found to include prevention, removal, recovery, and conversion; choice between these was found to depend on factors such as physical location, cost, and acceptability. Strategies for preventing intermedia transfer were found to include regulatory (restrictive and prohibitive), economic (incentives and sanctions), and educational. A mathematical model was developed and a gross California South Coast Basin Study conducted. (EPA)
W74-00703

QUALITY MANAGEMENT FOR WISCONSIN: A REPORT ON PRESERVING AND IMPROVING THE QUALITY OF THE AIR, LAND AND WATER RESOURCES.
For primary bibliographic entry see Field 05G.
W74-00715

A MATHEMATICAL MODEL OF THE NUTRIENT DYNAMICS OF PHYTOPLANKTON IN A NITRATE-LIMITED ENVIRONMENT,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 05C.
W74-00720

ON ADVECTION IN PHYTOPLANKTON MODELS,
Florida State Univ., Tallahassee. Dept. of Meteorology.
For primary bibliographic entry see Field 05C.
W74-00737

RECONNAISSANCE ANALYSIS OF EFFECTS OF WASTE-WATER DISCHARGE ON THE SHALLOW GROUND-WATER FLOW SYSTEM, LOWER LAS VEGAS VALLEY, NEVADA,
Nevada Univ., Reno. Center for Water Resources Research.
J. A. Westphal, and W. E. Nork.
Project Report No. 19, April, 1972. 37 p, 23 fig, 3 tab, 18 ref. EPA Project 13030 EQB.

Descriptors: *Waste water (Pollution), *Dispersion, *Seepage, *Water pollution, *Effluent, Industrial wastes, Municipal wastes, Hydrology, *Nevada, Model studies.
Identifiers: Chemical responses, Digital simulation models, Analog simulation models, *Las Vegas Valley (Nev).

Analog and digital simulation techniques were used in this quantitative analysis of the effect of effluent disposal on the shallow ground-water flow system in the Henderson-East Las Vegas area of Las Vegas Valley. Modeling results indicate that approximately 3600 acres of the shallow flow system in the vicinity of, and down gradient from, surface disposal sites near Henderson may be influenced by surface spreading of industrial and municipal effluent. As much as 70% of this effluent may further percolate downward into underlying fine-grained sediments. Cessation of surface disposal of effluents, however, would result in an ultimate decrease in flow in Las Vegas Wash amounting to about 5 cubic feet per second. Water quality is extremely variable within the study area. In the immediate vicinity of BMI disposal sites, effluent percolating into the shallow sediments is not in chemical equilibrium with the geological materials. Except on the western periphery of the study area, analyses from shallow piezometers show that shallow ground water has been influenced by effluent disposal. Virtually all shallow ground water in the study area is ultimately influenced by disposal of either industrial or municipal effluent. (Hoffman-North Carolina)
W74-00748

PROJECT REPORT FOR VENTURA COUNTY PLANNING DEPARTMENT AND CASITAS MUNICIPAL WATER DISTRICT ON WATERSHED DEVELOPMENT IMPACT ON LAKE CASITAS.
Montgomery Research, Inc., Pasadena, Calif.

Summary Report. March, 1972. 20 p, 1 fig.

Descriptors: *California, *Planning, Land use, *Water quality, Environmental effects, *Reservoirs, *Eutrophication, Water pollution effects, Water supply, Urbanization, Multiple-purpose reservoirs, Zoning, Recreation demand, Monitoring, Waste water treatment.
Identifiers: *Lake Casitas (Calif), Ventura County (Calif.), Development alternatives, Reservoir degradation.

An investigation of potential lake water quality changes resulting from various hypothetical watershed development alternatives was conducted for Lake Casitas, a multiple-use reservoir constructed in 1959 by the Bureau of Reclamation and located in the southwest corner of Ventura County (Calif.). It supplies potable water to part of the county, provides recreational activity and scenic attraction, and assists in flood control. The approach involved (a) defining water quality objectives for the lake; (b) identifying sources of pollution from specific development alternatives; (c) evaluating effects of probable pollutants on water quality; and (d) evaluating pollution prevention methods. Conclusions based on existing data are that Lake Casitas would experience serious problems of eutrophication by 1990 if development occurs by any of the 8 identified alternatives: (1) regional park urbanization, (2) low density urbanization, (3) urbanization medium density, (4) regional park, (5) estate development, (6) dry farming, (7) irrigated farming, and (8) high density urbanization. Thus none of these developments should be implemented now. More restrictive forms of development are not ruled out. Numerous other findings relating to climatology, hydrology, geology and soils of the Casitas Basin, water quality and life expectancy of Lake Casitas, the use and condition of the watershed and lake are included. Additional data collection, monitoring and research on environmental quality, and investment in environmental control and protection measures are recommended. (Edwards-North Carolina)
W74-00752

REDUCING EVAPORATION PLANT POLLUTION PLANT POLLUTION AND ITS TREATMENT,
Rosenlew (Oy. W.) A.B., Pori (Finland).
For primary bibliographic entry see Field 05D.
W74-00763

KRAFT PULPERS AND POLLUTION PROBLEMS AND PRESCRIPTIONS,
For primary bibliographic entry see Field 05D.
W74-00774

EVAPORATION RATES OF LIQUID HYDROCARBON SPILLS ON LAND AND WATER,
Toronto Univ. (Ontario). Dept. of Chemical Engineering and Applied Chemistry.
D. Mackay, and R. S. Matsugu.
Canadian Journal of Chemical Engineering, Vol 51, No 4, p 434-439, August 1973. 6 fig, 20 ref.

Descriptors: *Oil spills, *Oily water, *Evaporation, *Mass transfer, *Heat transfer, *Mathematical studies, *Theoretical analysis, Equations, Wind velocity, Kinetics, Temperature, Correlation analysis, Turbulence, Turbulent boundary layers.
Identifiers: Schmidt Number, Cumene, Hydrocarbons.

Mass and heat-transfer processes occurring during the evaporation of petroleum oil spills are described. Equations are developed which permit predictions of liquid temperature and evaporation rates. Experimental determinations of evaporation rates for cumene, water, and gasoline were used to calculate the evaporative mass-transfer coefficients which were then correlated with wind speed, liquid pool size, and vapor-phase Schmidt-Number. Good agreement was found between experimental and computed cumene temperature and evaporation rates. The correlation was compared with that for flat-plate mass transfer and showed good agreement, suggesting that turbulent transfer occurs at a rate which is enhanced by the liquid surface roughness. The more complicated problem of estimating the evaporation rates of hydrocarbon mixtures, as in oil spills, is also broached. (Brown-IPC)
W74-00775

A NEW ERA FOR COOLING WATER TREATMENT,
Betz Labs., Inc., Trevose, Pa.
For primary bibliographic entry see Field 05D.
W74-00777

INFLUENCE OF EVAPORATION CONDENSATE ON BIOLOGICAL PURIFICATION OF PULP WASH WATERS (EINFLUSS VON EINDAMPFKONDENSAT AUF DIE BIOLOGISCHE REINIGUNG VON ZELLSTOFFWASCHWASSERN),
Technische Universitaet, Dresden (East Germany).
For primary bibliographic entry see Field 05D.
W74-00781

SWITCHING FROM CALCIUM BISULFITE TO TWO-STAGE SODIUM-CALCIUM BISULFITE PULPING TO REDUCE WATER POLLUTION (ZNIZENIE ZNECISTENIA ODPADNYCH VOD PRECHODOM Z CA-BISULFITOVEHO VARENIA NA DVOJSTUPNOVE NA-CA-BISULFITOVE),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 05D.
W74-00789

OXYGEN-CONSUMING ORGANIC MATTER (BOD) IN EFFLUENTS ORIGINATING IN DIFFERENT PULPING PROCESSES OF THE WOODWORKING INDUSTRY: REVIEW OF LITERATURE DURING THE YEARS 1960-1970,
Finnish Pulp and Paper Research Inst., Helsinki.
H. Totterman.
Paperi ja Puu (Papper och Tra), Vol 54, No 8, p 437-449; No 9, p 505-508, 511-516; No 10, p 628-630, 633-636, Aug., Sept., and Oct. 1972. 8 tab, 15 diag, 54 ref.

Descriptors: *Pulp wastes, *Water pollution sources, *Biochemical oxygen demand, *Waste water (Pollution), Industrial wastes, Pulp and paper industry, Effluents, Reviews, Sulfite liquors, Bleaching wastes.
Identifiers: Kraft mills, Sulfite mills, NSSC mills.

This literature review presents information on the BOD loads of industrial effluents from unbleached and bleached kraft, sulfite (including bisulfite), and neutral sulfite semichemical pulp mills and wallboard factories. Actual BOD data are tabulated in chronological order of reference citations, and diagrams are included to compare the effects of modern against older manufacturing technologies on effluent BOD loads. (Brown-IPC)
W74-00793

ENVIRONMENTAL HEALTH ANALYSIS.
Saginaw County Metropolitan Planning Commission, Mich.

January 1, 1972. 194 p, 24 fig, 12 tab. HUD CPA-MI-05-28-0317.

Descriptors: *Comprehensive planning, *Data collections, *Environmental sanitation, Air pollution, Water pollution, Michigan, Solid wastes, Regional development, Regional analysis, Administration.
Identifiers: *Saginaw County (Michigan).

The Saginaw County (Michigan) Metropolitan Planning Commission inventoried and analyzed existing environmental conditions of air and water pollution, solid waste management, land use, and housing conditions. Local, state, and federal actions toward these areas were studied and solutions and alternatives to correcting problems are suggested. The 1960 population of the study area was about 190,750 and is expected to grow to about 312,000 by 1990. Economic growth is expected to exceed the national average and to be primarily in the area of manufacturing specialization. As a result of the study, 16 specific recommendations were made. These include: (1) promotion of consolidation and designation of environmental responsibilities, (2) promotion of public information on environmental matters, (3) creation of an advisory council for environmental quality, (4) implementation of a country-wide coordinated environmental program, (5) creation of units larger than the county level for environmental problems including more than one county, (6) promotion of a State air pollution control program, and (7) promotion of greater State and Federal funding for environmental programs. (Poertner)
W74-00808

CARGO SPILL PROBABILITY ANALYSIS FOR THE DEEP WATER PORT PROJECT,
Woodward-Lundgren and Associates, Oakland, Calif.
K. Nair, H. C. Shah, W. S. Smith, and D. S. Shah.
Available from NTIS Springfield, Va. 22151 as AD-758 330 Price $3.00 printed copy; $1.45 microfiche. Contract report for Corps of Engineers, February 1973. 132 p, 11 fig, 18 tab, 79 ref, 4 append. DACW61-73-C-0349.

Descriptors: *Water pollution sources, *Oil spills, *Ships, Forecasting, Harbors, Transportation, Oil industry, Model studies, Probability, Methodology, Analytical techniques.
Identifiers: *Oil spill probability, Oil tankers, Tanker loading, Tanker unloading.

A probability model for predicting the occurrence of liquid cargo spills from tankers was developed and quantified using a Bayesian statistical approach. The probability model considers the size, cause, and location characteristics of cargo spills. The probabilistic values were derived from subjective information obtained from people knowledgeable of tanker operations and the associated likelihood of cargo spills. Subjective information was also obtained regarding the influence of supertankers on the future probability of cargo spills. The results have allowed definition of the probable size, cause, and location of cargo spills. If a cargo spill occurs, its most probable size is less than one long ton, its cause human error, and it occurred at dock during loading and unloading operations. The most probable location of the larger size spills is at entrances to ports and coastal areas. (Woodard-USGS)
W74-00819

BIOLOGICAL INVESTIGATIONS OF LAKE WINGRA,
Wisconsin Univ., Madison. Lab. of Limnology.
For primary bibliographic entry see Field 05C.
W74-00833

REGIONAL POLLUTION STUDY: INVENTORY AND ANALYSIS.
Tulsa City-County Health Dept., Okla. Environmental Health Div.

Available from NTIS, Springfield, Va. 22151 as PB-218 076 - Price $5.25 printed copy; $1.45 microfiche. Indian Nations Council of Governments report, June 1972. 59 p, 1 fig, 11 tab, 5 ref. HUD CPA OK 0656 1012.

Descriptors: *Environmental control, *Water pollution control, *Air pollution, *Water pollution sources, Census, Computer programs, Systems analysis, Industrial wastes, Municipal wastes, Solid wastes, Treatment facilities, Data collections, Planning, Reviews.
Identifiers: *INCOG Environmental Pollution inventory.

This study is a preliminary inventory and analysis of the data contained in the Indian Nations Council of Governments (INCOG) Environmental Pollution File. A more complete analysis and use of the data in systems models will be made when the file is complete. It is intended that the file be a day-to-day operational tool for INCOG and other governmental departments for assessing the impact to the environment resulting from proposed community developments, both public and private. To be functional, the file must be updated continuously. A computer file is developed which contains information with respect to environmental protection by providing inventories of emissions to the ambient atmosphere, effluents to the streams, industrial wastewater sources, potable water sources and treatment plants, and solid waste collection systems and disposal sites. Summaries of the inventories and a preliminary analysis of the data are included. (Woodard-USGS)
W74-00849

FLUCTUATIONS IN NITRATE CONCENTRATIONS UTILIZED AS AN ASSESSMENT OF AGRICULTURAL CONTAMINATION TO AN AQUIFER OF A SEMIARID CLIMATIC REGION,
Eastern New Mexico Univ., Portales.
R. G. Taylor, and P. D. Bigbee.
Water Research, Vol 7, No 8, p 1155-1161, August 1973. 1 fig, 4 tab, 9 ref. OWRR A-034-NMEX (5).

Descriptors: *Nitrates, *Tracers, *Water pollution sources, *Fertilizers, *Farm wastes, Arid lands, *New Mexico, Return flow, Path of pollutants.

Nitrate concentrations were studied to demonstrate their applicability to examining agriculture practices which contaminate groundwater. Areas treated with nitrogenous fertilizers and subsequently irrigated have variations in nitrate content related directly to irrigation seasons. Agricultural industries with high animal densities and high water consumption for maintenance, were found to have high, but nonfluctuating nitrate concentrations. Areas with high animal density with low water usage for maintenance, areas with low animal density per land area, and agricultural practices for which little or no nitrogenous fertilizers were used demonstrated low aquifer nitrate concentrations regardless of water usage. (Knapp-USGS)
W74-00850

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME II.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00891

NANNOPLANKTON OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany; and Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00895

SUBMERGED VASCULAR PLANTS OF THE CHESAPEAKE BAY AND TRIBUTARIES,
American Univ., Washington, D.C. Dept. of Biology.
For primary bibliographic entry see Field 02L.
W74-00901

EMERGENT VASCULAR PLANTS OF CHESAPEAKE BAY WETLANDS,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 02L.
W74-00902

VASCULAR PLANTS OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
For primary bibliographic entry see Field 02L.
W74-00903

INTERACTION OF NITRILOTRIACETIC ACID WITH SUSPENDED AND BOTTOM MATERIAL.
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
For primary bibliographic entry see Field 05A.
W74-00926

DYNAMIC WATER QUALITY FORECASTING AND MANAGEMENT,
Manhattan Coll., Bronx, N.Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W74-00927

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT SULFATE-REDUCING BACTERIA (BUT WERE AFRAID TO ASK),
D. P. Johnston.
Baroid News Bulletin, Vol 24, No 1, p 15-19, 1973. 2 fig.

Descriptors: *Wells, Water wells, Oil wells, *Bacteria, Water analysis, *Bactericides, *Corrosion, Pitting, Chemical reactions, Hydrogen ion concentration, Sulfur bacteria.
*Sulfate-reducing bacteria, *Desulfovibris, Electrochemical corrosion.

Microorganisms cause problems throughout the petroleum industry. Several types of bacteria have been implicated; undoubtedly, the most troublesome organism is the sulfate-reducing organism, Desulfovibrio. Sulfate-reducing bacteria have a world-wide distribution, and exist in a variety of environments including drilling fluids, water-injection systems, gas storage reservoirs, and producing formations. These widespread organisms are physiologically unique in that they reduce sulfate to sulfide, the latter being well known for its role in the corrosion process. Laboratory personnel are working toward a better understanding of the science of petroleum microbiology. Sulfate-reducing bacteria have been studied in great detail, and chemicals to control this troublesome organism are marketed under the SURFLO trademark. (Campbell-NWWA)
W74-00942

WELL CONSTRUCTION HELPS DETERMINE WATER QUALITY,
Agricultural Research Service, Beltsville, Md. Farmstead Water Systems Research.
E. E. Jones, Jr.
Journal of Environmental Health, Vol 35, No 5, p 443-450, March-April, 1973. 15 fig, 2 tab, 3 ref.

Descriptors: *Design, Water Supply, *Water pollution, Contamination, *Groundwater, Agricultural chemicals, Path of Pollutants, *Pesticide residues, Coliforms, Disperson, Water quality.
Identifiers: Agricultural research service, *Locating sanitary defects.

Information gained on the relationship between well construction and water quality in trying to determine the paths of entrance into, and the means of excluding, pesticides from wells is presented. Three farmstead water supply wells characterized by an obvious lack of adequate sanitary protection are described. When wells of this nature are identified, reconstruction or abandonment and proper closure is emphasized. Factors contributing to non-uniform contamination of a well are identified. Deterioration of ground water quality with respect to the entrance of surface water into a well is discussed. A need for study of wells apparently having adequate sanitary protection but showing signs of surface contamination, rapid changes in water quality with rainfall, bacterial contamination, turbidity, and/or the presence of pesticides is stressed. (Campbell-NWWA)
W74-00954

SIGNIFICANCE OF DOCKS IN DISSEMINATION OF DIPHYLLOBOTHRIASIS NEAR RIVERS AND LARGE TRANSPORT WATER BODIES (ACCORDING TO DATA FROM THE VOLGA PIERS AND THE VOLGOGRAD RESERVOIR), (IN RUSSIAN),
Institute of Medical Parasitology and Tropical Medicine, Moscow (USSR).
For primary bibliographic entry see Field 05C.
W74-00991

BETA RADIOACTIVITY OF PERIPHYTON IN CERTAIN DAM RESERVOIRS,
Instytut Gospodarki Kommunalnej, Chorzow (Poland). Zaklad Radiol. GOP.
J. Kwapulinski.

Acta Hydrobiol, Vol 14, No 3, p 273-286, 1972, Illus.
Identifiers: Dams, *Periphyton, *Radioactivity, *Reservoirs, Beta radioactivity.

Investigations permitted the distinction of the period of maximum beta radioactivity, observed in the period of increased radioactivity of the water. The cumulation coefficient in the examined limnic and rheolimnic reservoirs is of the order, 1000-10000.--Copyright 1973, Biological Abstracts, Inc.
W74-00993

OPTIMIZATION OF SURFACE-WATER QUALITY: A PROPOSAL FOR SOLVING A FUTURE PROBLEM (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene-Institut.
R. H. W. Schubert.
Zentralbl Bakteriol Parasitenkd Infektionskr Hgy Erste Abt Orig Reihe B Hyg Praev Med, Vol 155, No 3, p 248-255, 1971, English summary.
Identifiers: Flow, *Optimization, Pollution, River, *Sewage disposal, Surface waters, *Waste transport, Water quality, *Regional analysis.

It is not possible to solve the current environmental problems with conventional methods; they must be treated regionwise, using a model to simulate the conditions present. Based on functions which flowing waters will be having in the Central European civilization and economy, quality of the water and sewage disposal are discussed. Shortcomings of the current system have led to inadequate economy of flowing waters. Classification of waste products, and regulations for the discharge of sewage into running waters are necessary to use flowing waters optimally for waste transport and to provide for sufficient stretches necessary for self purification of the water. Toxic substances and compounds which do not readily disintegrate may be discharged into flowing water only at moderate amounts which do not impair self purification. Medium and readily disintegratable substances should be discharged only at amounts which do not exceed the maximum permissible load on the river water. The principles of a mathematical model are explained, whereby a river is simulated from its source to its mouth, which aids optimization waste transport, self purification, and water quality.--Copyright 1973, Biological Abstracts, Inc.
W74-00994

EXPERIMENTAL DATA ON THE SORPTION CAPACITIES OF WATER BEARING STRATA AND SURVIVAL OF ESCHERICHIA COLI DURING BACTERIAL CONTAMINATION OF GROUND WATER (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
B. M. Kudryavtseva.
Gig Sanit, Vol 37, No 7, p 19-23, 1972, Illus, English summary.
Identifiers: Bacterial contamination, *E. coli, *Groundwater contamination, *Sorption capacities, Strata, *Filtration, Water pollution sources.

A filtration installation was studied. The adsorption process was an important factor in the bacterial self purification of ground water and promoted a longer survival of bacteria. In fine-grain sand, E. coli survived up to 200 days and could be a potential hazard for ground water contamination.--Copyright 1973, Biological Abstracts, Inc.
W74-01002

CIRCULATION IN THE BAY OF AMPASINDAVA (MADAGASCAR) AND ITS BIOCHEMICAL IMPLICATIONS (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceanographique (ORSTOM) de Nosy-Be.
Y. Magnier, and B. Piton.
Cah O R S T O M (Off Rech Sci Tech Outre-Mer) Ser Oceanogr, Vol 10, No 1, p 75-97, Illus, 1972, English summary.
Identifiers: Bays, Biochemical studies, *Circulation (Estuarine), *Madagascar (Ampasindava Bay), *Oxygen, *Salinity, Estuarine environment, Path of pollutants.

After a 1 yr survey, it appears that the main dynamic feature of the Ampasindava Bay, Madagascar is the estuarine circulation through the rainy season, resulting in the production of bottom water with low O2 and high nutrient salt values. During the dry season, as the estuarine circulation weakens greatly, the salinity becomes homogenous and the nutrients almost disappear. Two tentative methods for transport estimation are proposed and discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01005

FOUR METASAPROBIC COMMUNITIES OF COLORLESS FLAGELLATES,
V. Sladecek.
Arch Protistenkd, Vol 114, No 1/2, p 245-248, 1972, Illus.
Identifiers: Bodonetum-putrini, *Flagellates, Hexamitetum-inflati, Oicomonadetum-socialis, *Polytometum-uvellae, *Metasaprobic communities, Sewage, Bacteria.

Four successive communities of colorless flagellate saprobes are described: Polytometum uvellae, Hexamitetum inflati, Oicomonadetum socialis and Bodonetum putrini. There is a direct succession between the 2 first named communities, P. uvellae being a pioneer association in decaying municipal sewage. All 4 associations belong to the formation Bacterio-Zooflagellation.--Copyright 1973, Biological Abstracts, Inc.
W74-01006

SILICATE IN THE WATER OF THE BAY OF VIGO (IN SPANISH),
Instituto de Investigaciones Pesqueras, Vigo (Spain). Laboratorio de Investigaciones Pesqueras.
For primary bibliographic entry see Field 02L.
W74-01007

STUDIES OF BIOLOGICAL ENERGY BALANCE AND BIOLOGICAL PRODUCTIVITY IN THE USSR LAKES (IN RUSSIAN),
For primary bibliographic entry see Field 02H.
W74-01009

ENVIRONMENTAL IMPACT STUDY FOR EXPANSION ON THE VILLAGE CREEK SEWAGE TREATMENT PLANT,
Advanced Technology Center, Inc., Dallas, Tex.
For primary bibliographic entry see Field 05D.
W74-01035

STREAM AND LAKEFRONT FIELD INVENTORY, VOLUME I - SUMMARY.
Lorain County Regional Planning Commission, Elyria, Ohio.

Lorain County Water Pollution Study Report No. 12. 1967. 227 p, 9 fig, 20 plates, 169 tab, 3 ref, 6 append.

Descriptors: *Water quality, *Water pollution sources, *Data collections, *Ohio, Odor, Color, Water sampling, On-site investigations, On-site data collections.
Identifiers: *Lorain County (Ohio), Lake Erie, Black River.

A graphic presentation is provided of water quality data collected in 1966-1967 for Lorain County, Ohio. The field inventory was designed to determine the general nature of the water pollution problem in the county and was particularly interested in the location of polluted waters, the origin of the pollutants and the estimated discharge. The emphasis was on the aethetic nature of the pollution rather than on laboratory analyses and physical/chemical properties. Thus, one output of the inventory is the identification of points where water samples should be taken and tested and specific problem locations. Most of these points are concentrated on the Black River and the Lake Erie waterfront. Almost 2,000 wastewater outlets and/or specific wastes were identified. The largest sources of wastewater were cooling water discharges from electric power and steel industries. Tables of summary data for specific locations throughout the county are included. Pollution is worst on the main stem of the Black River and the Lake Erie waterfront since most industrial and municipal discharges are concentrated in these areas. (Elfers-North Carolina)
W74-01046

SEEPAGE FLOWS--FIELD DATA MEASUREMENTS FOR EVALUATION OF POTENTIAL CONTRIBUTION OF FERTILIZERS TO GROUNDWATER POLLUTION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering.
L. Michna, and E. L. Bourodimos.
Soil Science, Vol 115, No 6, p 401-408, June 1973. 5 fig, 12 ref. OWRR A-027-NJ (2).

Descriptors: *Leaching, *Path of pollutants, *Fertilizers, Nitrates, *New Jersey, Groundwater movement, Data collections, Permeability, Isotropy, *Seepage.

Losses from nitrogen fertilizers into natural waters are largely as nitrates and can occur both through leaching and surface runoff. Several approaches are currently being used to attack this problem. All have the advantage of obtaining data under actual field conditions. Field data taken at the Adelphia Experimental Station of Rutgers University include soil permeability, groundwater hydraulic gradients, and seepage velocities. The flow field characteristics are determined by measuring groundwater table fluctuations and by evaluating the coefficient of permeability. Groundwater fluctuations are measured through a continuous monitoring and determination of the piezometric grade line. The coefficient of permeability is measured by means of tube and auger hole methods. The coefficient of permeability for this particular soil condition (mixture of fine sand and silt) practically does not change within the observed depth of groundwater table fluctuations. A pumping test is underway for verification of the coefficient of permeability by direct evaluation of the flow rate (and thereby discharge velocity), the hydraulic gradient, and pollutant concentration measurements. (Knapp-USGS)
W74-01054

BOTTOM FAUNA OF DEAD VISTULA,
Warsaw Univ. (Poland). Zoological Inst.
For primary bibliographic entry see Field 05C.
W74-01073

MOVEMENT OF SALT AND WATER IN RELATIVELY DRY SOILS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
For primary bibliographic entry see Field 02G.
W74-01088

PRIMINARY SYSTEM DEVELOPMENT, CHEMICAL HAZARDS RESPONSE INFORMATION SYSTEM (CHRIS),
Little (Arthur D.), Inc., Cambridge, Mass.
D. S. Allan, G. H. Harris, G. R. Schimke, and R. W. Neal.

Descriptors: *Water pollution, *Chemical wastes, *Warning systems, Hazards, Safety, Toxicity, Water pollution control, Discharge (Water).
Identifiers: Emergency response, Hazardous chemicals, Accidental chemical releases.

A Chemical Hazards Response Information System (CHRIS) is designed to satisfy the information needs of Coast Guard field personnel when responding to emergencies involving the accidental release of hazardous chemicals into water. It will also serve nonemergency needs as they apply to the development of improved safety in the water transport of hazardous chemicals. CHRIS consists of the organization and facilities necessary for the system development and operation, and five hard-copy reference guides (or manuals) containing chemical-specific data, local information on vulnerable life forms and property and response resources, hazard assessment procedures, and response methods. These data bases are augmented with a computerized hazard assessment system. (Woodard-USGS)
W74-01092

5C. Effects of Pollution

A EUTROPHICATION MODEL OF THE WHITE RIVER BASIN ABOVE BEAVER RESERVOIR IN NORTHWEST ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
R. A. Gearheart.
Available from the National Technical Information Service as PB-224 811, $7.50 in paper copy, $1.45 in microfiche. Arkansas Water Resources Research Center, Fayetteville Publication No. 15, 1973. 100 p, 6 fig, 23 tab, 47 ref, 3 append. OWRR B-012-ARK (4). 14-01-0001-1877.

Descriptors: *Eutrophication, Nutrients, *Nitrogen, *Posphorus, Urban runoff, Growth rates, *Arkansas, Model studies, Agricultural runoff.
Identifiers: *Beaver Reservoir (Ark), *White River basin (Ark), *Algal growth rates, Nutrient budget.

The purpose of this investigation was threefold: (1) to determine the rate of nutrient accumulation in Beaver Reservoir, (2) to develop a eutrophication model to predict future eutrophication levels, and (3) to identify and isolate the major nutrient contributors of Beaver Reservoir. Stream and reservoir sampling networks were established and monitored for the various forms of soluble nitrogen and phosphorus. A nutrient budget for Beaver Reservoir was determined, and the rate of nutrient accumulation calculated from the nutrient inflow and outflow rates. The major nutrient contributors were based on the various types of runoff (i.e., agricultural and urban runoff occurring around the reservoir). These were ranked according to the amount contributed to total nutrient inflow. Overall algal growth rates for the six Beaver Reservoir sampling stations were developed from a reservoir model equation. Various parameters which influence algal growth were regressed to establish an overall rate equation. Other prediction equations were established for regression for nutrient loadings from major nutrient contributors. (Babcock-Arkansas)
W74-00555

STUDIES ON BRACKISH WATER PHYTOPLANKTON,
North Carolina Univ., Chapel Hill. Dept. of Botany.
P. H. Campbell.
Available from NTIS, Springfield, Va., 22151 as COM73-10672 Price $6.00 printed copy; $1.45 microfiche. North Carolina University Sea Grant Publication UNC-SG-73-07, March 1973. 406 p.

Descriptors: *Phytoplankton, *Systematics, *Estuaries, *Ponds, *Water pollution effects, Aquatic life, Environmental effects, Salinity, Sewage effluents, Fish, Ecosystems, Ecosystems, Ecology, Growth rates, Nutrients, Diatoms, Water temperature, Dissolved oxygen, Light penetration, Hydrogen ion concentration, Classification.
Identifiers: *Taxonomy.

This study on brackish water phytoplankton contains 2 reports. In the first report the phytoplankton of Gales Creek, a small shallow coastal plain estuary near Morehead City, N. C., was studied for over a year. Special emphasis was placed on determining the species composition and distribution patterns of the phytoflagellates and in measuring environmental factors which may influence the presence and distribution of these species. In the second report, polluted brackish ponds were found to support a high level of primary productivity with sewage plant effluent, but whether this productivity can be converted to a dependable harvest remains to be seen. So far, the production of blue crabs in the ponds has been too low for commercial interest, the palaemonetes shrimp that grew well are not valued as human food, and edible fish did not grow. The system was strongly taxed by very dense phytoplankton concentrations, primarily of a single species. (See W74-00590 and W74-00591) (Woodard-USGS)
W74-00589

THE PHYTOPLANKTON OF GALES CREEK WITH EMPHASIS ON THE TAXONOMY AND ECOLOGY OF ESTUARINE PHYTOFLAGELLATES--PART 1 OF STUDIES ON BRACKISH WATER PHYTOPLANKTON,
North Carolina Univ., Chapel Hill. Dept. of Botany.
P. H. Campbell.
In: North Carolina University Sea Grant Publication UNC- SG-73-07, p 1-359, March 1973. 24 fig, 33 plates, 11 tab, 279 ref.

Descriptors: *Phytoplankton, *Systematics, *Estuaries, *North Carolina, Classification, Aquatic life, Diatoms, Environmental effects, Sampling, Water temperature, Salinity, Dissolved oxygen, Light penetration, Hydrogen ion -concentration, Nutrients.
Identifiers: *Phytoflagellates, *Taxonomy, *Gales Creek (N.C.).

The phytoplankton of Gales Creek, a small shallow coastal plain estuary near Morehead City, N. C., was studied for over a year. Special emphasis was placed on determining the species composition and distribution patterns of the phytoflagellates and in measuring environmental factors which may influence the presence and distribution of these species. A total of 187 diatom taxa were identified. Diatoms exhibited a classic bimodal pattern of seasonal abundance with maxima in spring and autumn. A total of 152 species of phytoflagellates in 49 genera and 9 classes of algae are described and figured, including 32 species, 4 varieties and 6 combinations new to science. Phytoflagellates dominated the phytoplankton throughout most of the year. The mean yearly standing crop for phytoflagellates was only 500,000 cells/liter. Low densities are attributed to low nitrate concentrations and high flushing rate of the estuary. Phytoflagellate seasonal distribution was bimodalwith moderate densities in spring and maximum cell concentrations in late summer. A majority of the dominant phytoflagellates were eurythermal and euryhaline species. (See also W74-00589) (Woodard-USGS)
W74-00590

PHYTOPLANKTON POPULATIONS IN BRACKISH WATER PONDS, A REVISED REPORT--PART II OF STUDIES ON BRACKISH WATER PHYTOPLANKTON,
North Carolina Univ., Chapel Hill. Dept. of Botany.
P. H. Campbell.
In: North Carolina University Sea Grant Publication UNC-SG-73-07, p 361-406, March 1973. 4 fig, 3 plate, 3 tab, 39 ref.

Descriptors: *Water pollution effects, *Brackish water, *Ponds, *Sewage effluents, *Aquatic life, Environmental effects, Ecosystems, Ecology, Fish, Phytoplankton, Salinity, Systematics, Classification, Growth rates.
Identifiers: *Taxonomy.

Polluted brackish ponds were found to support a high level of primary productivity with sewage plant effluent, but whether this productivity can be converted to a dependable harvest remains to be seen. So far, the production of blue crabs in the ponds has been too low for commercial interest, the palaemonetes shrimp that grew well are not valued as human food, the edible fish did not grow. The system was strongly taxed by very dense phytoplankton concentrations, primarily of a single species, so perhaps better results could be achieved by holdings these densities below the 100,000 cells/ml concentrations where species diversity can still be maintained, possibly by increasing the flushing rate of the ponds from their normal one to two times per month. The ponds support a wide diversity of species representing 10 classes of phytoplankton. The 155 taxa of phytoplankton observed in the 16-month study included 97 diatoms, 16 dinoflagellates, 9 cryptomonads, 8 prasinophytes, 6 xanthophytes, 5 chrysophytes, 5 green algae, 4 euglenoids, 3 haptophytes, and 2 blue-green algae. A number of these organisms did not readily fit existing descriptions and are probably new taxa merely awaiting further observation and study. (See also W74-00589) (Woodard-USGS)
W74-00591

BIOMAGNIFICATION OF P,P'-DDT AND METHOXYCHLOR BY BACTERIA,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 05B.
W74-00615

SURVIVAL OF VIBRIO PARAHAEMOLYTICUS IN OYSTER SHELLSTOCK AT TWO DIFFERENT STORAGE TEMPERATURES,
Maryland Dept. of Health and Mental Hygiene, Baltimore. Labs. and Research Administration.
W. G. Johnson, Jr., A. C. Salinger, and W. C. King.
Applied Microbiology, Vol 26, No 1, p 122-123, July 1973. 2 tab, 8 ref.

Descriptors: *Pathogenic bacteria, *Enteric bacteria, *Storage, *Temperature, Marine bacteria, Isolation, Oysters, Pollutant identification, Anaerobic bacteria, Shellfish, Virginia, Maryland.
Identifiers: Survival, *Oyster shellstock, *Vibrio parahaemolyticus, Culture media, Fisher Bay, *Chincoteague Bay.

The presence and survival of V. parahaemolyticus were determined in oyster shellstock taken from an outlet, Fishing Bay, of the Chesapeake Bay and transported to a floating area in the Chincoteague Bay, an inlet of the Atlantic Ocean. Some of the samples collected at intervals from Chincoteague Bay were examined immediately while others were stored at 35C and 4C. V. parahaemolyticus was isolated by culturing equal volumes of oyster meats and liquor from 12 organisms in Trypticase soy broth. After 24 h incubation at 35C samples from each dilution were streaked on thiosulfate-citrate-bile salt-sucrose agar. These were then incumbated at 35C for 24 h. Vibrio parahaemolyticus was found to be present, to survive storage for at

least 3 weeks at 4C, and to multiply after being held for 2 to 3 days at 35C. (Holoman-Battelle)
W74-00616

SOME OBSERVATIONS ON THE INCORPORATION OF NOVOBIOCIN INTO HEKTOEN ENTERIC AGAR FOR IMPROVED SALMONELLA ISOLATION,
Campbell Inst. for Food Research, Camden, N.J.
For primary bibliographic entry see Field 05A.
W74-00617

IDENTIFICATION AND CHARACTERIZATION OF THE MICROFLORA AND SPOILAGE BACTERIA IN FRESHWATER CRAYFISH PROCAMBARUS CLARKII (GIRAD),
Louisiana State Univ., Baton Rouge. Dept. of Food Science.
For primary bibliographic entry see Field 05A.
W74-00620

CONDITION OF COLIFORM ORGANISMS INFLUENCING RECOVERY OF SUBCULTURES ON SELECTIVE MEDIA,
Nebraska Univ., Lincoln. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 05B.
W74-00621

EFFECTS OF CALCIUM AND MAGNESIUM IONS AND HOST VIABILITY ON GROWTH OF BDELLOVIBRIOS,
California Univ., Davis. Dept. of Bacteriology.
J. C -C.Huang, and M. P. Starr.
Antonie van Leeuwenhoek, Vol 39, No 1, p 151-167, 1973. 5 tab, 31 ref.

Descriptors: *Cultures, *Calcium, *Magnesium, *Growth rates, *Hosts, Bioassay, Nutrients, Viability, Parasitism.
Identifiers: *Bdellovibrio, Culture media, Amino sugars, Sugars, Bacterial physiology, Spirillum serpens.

Bdellovibrio spp strains 6-5-S, 100, 109 and A3.12 multiply in the presence of viable but non-proliferating or heat-killed cells of Spirillum serpens strain VHL suspended in buffers supplemented with Ca (2 plus) and or Mg (2 plus). Ca (2 plus) and Mg (2 plus) independently stimulated the growth of bdellovibrios: additive effects were noted. Multiplication of Bdellovibrio in the presence of Ca (2 plus) and Mg (2 plus) was associated with the release into the culture supernatant solution of UV-absorbing materials and of amino sugars. The growth rate of Bdellovibrio strain 6-5-S in suspensions of heat-killed host cells was lower than in living but non-proliferating host cells. All Bdellovibrio spp strains tested required added Ca (2 plus) for growth in cell suspensions of homologous or heterologous host bacteria which have been grown in minimal medium. Bdellovibrio sp strain 109 (Jerusalem) was capable of growing in the presence of the low level of Ca (2 plus) bound in situ to the cells of its host, E. coli B, when the host cells had been cultivated in a complex medium but not when the host cells had been grown in a Ca (2 plus)-depleted minimal medium. Addition of ethylenediaminetetraacetic acid prevented Bdellovibrio growth, which was restored by addition of Ca (2 plus) and Mg (2 plus). The cations Ca (2 plus) and Mg (2 plus) are essential for activity of bacteriolytic and other enzymes and they might also directly affect Bdellovibrio growth rather than only indirectly by affecting attachment to the host cell, maintaining integrity of the host spheroplasts, and increasing the burst size. (Little-Battelle)
W74-00625

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION OF FRESHWATER ALGAE: AN EXPERIMENTAL STUDY. II. THE ROLE OF PH AND THE CARBON DIOXIDE-BICARBONATE SYSTEM,
Michigan State Univ., East Lansing. Dept. of Botany.
B. Moss.
Journal of Ecology, Vol 61, No 1, p 157-177, March 1973. 7 fig, 5 tab, 50 ref.

Descriptors: *Environmental effects, *Aquatic algae, *Ecological distribution, *Laboratory tests, *Growth rates, *Water properties, Carbon dioxide, Bicarbonates, Hydrogen ion concentration, Plant growth, Trophic level, Iron, Trace elements, Water quality, Cyanophyta, Chlorophyta, Euglenophyta, Chrysophyta, Pyrrophyta, Diatoms, Dinoflagellates, Incubation, Cultures, Oligotrophy, Eutrophication, Biomass, Carbonates, Sodium chloride, Water pollution effects, Chelation, Hardness (Water), Plant physiology, Bioassay, Limiting factors.
Identifiers: Data interpretation, EDTA, Algal physiology, Chlamydomonas reinhardii, Euglena gracilis, Trachelomonas grandis, Flagellates, Desmids, Cryptomonads, Sodium bicarbonate, Gloeocapsa, Gloeotrichia, Tolypothrix distorta, Cryptomonas ovata, Eunotia, Nitzschia palea, Synura petersenii, Peridinium cinctum, Closterium acerosum, Cosmarium botrytis, Desmidium swartzii, Eudorina californica, Gonatozygon monotaenium, Haematococcus droebakensis, Mesotaenium kramstai, Micrasterias spp, Oedogonium cardiaceum, Pandorina morum, Pediasstrum spp, Pleurotaenium trabecula, Roya anglica, Scenedesmus quadricauda, Ulothrix fimbriata, Volvox aureus, Zygnema spp.

Experiments have been conducted to determine the effects of the pH-CO2-bicarbonate system on the growth of algal species of the Chlorophyta, Chrysophyta, Pyrrophyta, Euglenophyta, Cyanophyta, and Cryptophyta (Cryptomonads). Series of media with different pH values were made by the addition of dilute HCl or sodium bicarbonate to standard media. Growth was measured as an increase in cell or coenobium numbers over a suitable period of the logarithmic phase. At least three, and sometimes as many as ten, counts were made at suitable intervals for the plotting of logarithmic growth curves. Carbonate and bicarbonate levels were determined on samples of media, prepared, autoclaved, and allowed to stand exactly as those used in the experiments. Oligotrophic species of algae would not grow at pH values above 8.6-8.85, while eutrophic ones grew at pH values above 9, and at considerably higher bicarbonate levels than did the former. The results are interpreted in terms of the available free CO2 at various combinations of pH and bicarbonate. Oligotrophic species are probaby confined to free CO2 as an inorganic carbon source for photosynthesis, and may be unable to absorb it below certain concentrations (at least 0.011 mM). Eutrophic species may either use bicarbonate directly or may be able to use free CO2 at very low concentrations. Field observations support the hypothesis that the availability of free CO2 prevents growth of oligotrophic species in hard waters. (See also W73-13546 and W74-00640 thru W74-00641) (Holoman-Battelle)
W74-00639

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION OF FRESHWATER ALGAE: AN EXPERIMENTAL STUDY. III. EFFECTS OF TEMPERATURE, VITAMIN REQUIREMENTS AND INORGANIC NITROGEN COMPOUNDS ON GROWTH,
Michigan State Univ., East Lansing. Dept. of Botany.
B. Moss.
The Journal of Ecology, Vol 61, No 1, p 179-192, March 1973. 6 fig, 3 tab, 48 ref.

Descriptors: *Growth rates, *Environmental effects, *Nutrient requirements, *Water temperature, *Aquatic algae, *Laboratory tests, *Ecological distribution, Plant growth, Biomass, Nitrogen, Vitamins, Chlorphyta, Trophic level, Euglenophyta, Water quality, Nutrients, Nitrates, Oligotrophy, Eutrophication, Cultures, Bioassay, Plant physiology, Limiting factors.
Identifiers: Algal physiology, Vitamin B12, Biotin, Thiamine, Desmids, Micrasterias americana, Pleurotaenium trabecula, Cosmarium, Gonatozygon Monotaenium, Roya anglica, Desmidium swartzii, Pandorina morum, Cosmarium botrytis, Closterium acerosum, Volvox aureus, Eudorina californica, Haematococcus droebakensis, Mesotaenium krastai, Scenedesmus quadricauda, Pediastrum duplex, Ammonium, Gloeocapsa, Gloeotrichia, Tolypothrix distorta var. symplocides, Culture media, Euglena gracilis, Chlamydomonas reinhardii.

Experiments to determine the growth rate of 15 species of algae at temperatures between 4 and 36 C were carried out in constant temperature water baths fitted with heater and refrigeration units. The experimental flasks were shaken at 40 strokes/min on a submerged reciprocating tray. Size of the organisms was measured as cellular organic matter capable of oxidation by hot acid potassium dichromate, using exponential phase, unsynchronized cultures grown at or near the optimum temperature for growth. Vitamin requirements (vitamin B12, biotin, thiamineWERE STUDIED IN SETS OF VARIOUSLY MODIFIED STANDARD MEDIA. The maximum growth rates of oligotrophic species tended to be smaller than those of eutrophic species. Temperature obtima for growth under the conditions used did not differ between the two groups. Possible adaptive advantages of low growth rates in infertile waters are duscussed in relation to theoretical generalizations on the maturity of ecosystems. Some members of both groups required vitamin B12 for growth, and most species tested could use either nitrate or ammonium as a nitrogen source. (See also W74-00639) (Holoman-Battelle)
W74-00640

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION OF FRESHWATER ALGAE: AN EXPERIMENTAL STUDY. IV. GROWTH OF TEST SPECIES IN NATURAL LAKE WATERS, AND CONCLUSION,
Michigan State Univ., East Lansing. Dept. of Botany.
B. Moss.
Journal of Ecology, Vol 61, No 1, p 193-211, March 1973. 12 fig, 1 tab, 42 ref.

Descriptors: *Bioassay, *Environmental effects, *Aquatic algae, *Lakes, Limiting factors, *Ecological distribution, *Laboratory tests, Trophic level, Chlorophyta, Nutrient requirements, *Michigan, Hardness (Water), Hydrogen ion concentration, Oligotrophy, Eutrophication, Phosphorus, Scenedesmus, Chlorella, Diatoms, Chrysophyta, Plant physiology, Carbon dioxide, Cultures.
Identifiers: Natural waters, Algal physiology, Pandorina morum, Cosmarium botrytis, Desmids, Micrasterias americana, Pleurotaenium trabecula, Nitzschia palea, Achnanthes, Fragilaria, Bear lake, Duck Lake, Gull Lake, Lawrence Lake, Wintergreen Lake, Culture media.

Growth of two eitrophic species, Pandorina morum and Cosmarium botrytis, and of two oligotrophic species Micrasterias americana and Pleurotaenium trabecula, was measured in filtered natural lake waters of varied chemical composition. Such experiments were carried out to test the following assertions: (1) The reduction of the free CO2 level, brought about by experimental increase in pH, should decrease growth of oligotrophic species in soft waters. The reduction of pH in hard waters should permit increased growth of oligotrophic species. (2) In the presence of adequate phosphate, nitrate and other potentially

limiting nutrients, eutrophic species should be able to grow in both soft and hard waters. In all waters but those of a heavily fertilized lake, addition of a mixture of potentially limiting nutrients gave much greater growth than that obtained in controls. The oligotrophic species grew better in hard waters if the pH was reduced, and less well in soft waters when the pH was increased. The results are in accord with predictions made from laboratory experiments with defined culture media. Bio-assays, employing the indigenous flora as test organisms, were carried out for limiting nutrients in the waters used. In soft waters both nitrogen and phosphorus were found to be limiting to algal growth in general, while phosphorus along appeared limiting in two hard-water lakes. The interpretation of bioassays is discussed. A general summary of the conclusions of Parts I-IV is presented as an overall hypothesis. (See also W74-00639) (Holoman-Battelle)
W74-00641

THE STANDING CROP AND PRIMARY PRODUCTIVITY OF THE PHYTOPLANKTON OF ABBOT'S POND, NORTH SOMERSET,
Bristol Univ. (England). Dept. of Botany.
M. Hickman.
Journal of Ecology, Vol 61, No 1, p 269-287, March 1973. 10 fig, 3 tab, 45 ref.

Descriptors: *Primary productivity, *Standing crops, *Biomass, *Phytoplankton, *Ecological distribution, Limiting factors, Aquatic algae, On-site tests, Chrysophyta, Dominant organisms, Pyrrophyta, Chlorophyta, Depth, Plant populations, Light intensity, Photosynethesis, Radioactivity techniques, On-site data collections, Diatoms, Water quality, Water properties, Seasonal, Temporal distribution, Spatial distribution.
Identifiers: *Abbot's Pond (U.K.), Photosynthetic index, Cryptomonads, Chlorophyll a, Enumeration, Cell volume, C-14, Asterionella formosa, Peridinium aciculiferum, Wolosyznskia, Scenedesmus granulatus, Pandorina morum, Chlamydomonas monadina, Synura, Chrysococcus diaphanus, Vertical distribution, Synedra acus var. angustissima, Diatoma elongatum, Trachelomonas volvocina, Stephanodiscus rotula, Rhodomonas minuta var. nannoplanktica, Cryptomonas erosa.

The standing crops and primary productivity of the phytoplankton of a small, eutrophic body of water, Abbot's Pond, have been studied over a 24-month period. Water samples collected with a closing water sampler at 0.5-m intervals were kept in subdued light for standing crop and primary productivity measurements. Standing crops were determined by cell counts, and by measuring cell volumes, and the chlorophyll a content of the phytoplankton. Primary productivity was measured using the C-14 technique. The total alkalinity and pH of each sample were measured so that the total dissolved carbon dioxide (mg/l) in each water sample could be calculated. In general, both standing crops and primary productivity were large, and decreased with increasing depth and hence decreasing light intensity. However, exceptions to this general trend did occur. Results are considered with reference to the species of phytoplankters. Relationships of different measures of standing crop are discussed. Also, relationships between productivity and chlorophyll a content, and between productivity and light intensity, were investigated, as was the photosynthetic index. The mean yearly primary productivity of the phytoplankton was approximately twelve times that of the epipelon on an areal basis. The most important factor limiting productivity appeared to be light. (Holoman-Battelle)
W74-00651

ELECTRON MICROSCOPE AND PHYSICAL CHEMICAL CHARACTERIZATION OF C-PHYCOCYANIN FROM FRESH EXTRACTS OF TWO BLUE-GREEN ALGAE,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
For primary bibliographic entry see Field 05A.
W74-00652

MICROBIAL FORMATION OF NITROSAMINES IN VITRO,
Cornell Univ., Ithaca, N.Y. Lab. of Soil Microbiology.
For primary bibliographic entry see Field 05B.
W74-00654

NEGATIVE CHEMOTAXIS OF MARINE BACTERIA TO TOXIC CHEMICALS,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
L. Y. Young, and R. Mitchell.
Applied Microbiology, Vol 25, No 6, p 972-975, June 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Marine bacteria, *Organic compounds, *Inorganic compounds, Heavy metals, Toxicity, Chemicals, Viability, Copper sulfate.
Identifiers: *Chemotaxis, *Heterotrophic bacteria, *Pseudomonads, Hydrocarbons, Chloroform, Ethanol, Toluene, Organic solvents, Benzene, Lead nitrate.

The pattern and extent of negative chemotactic behavior are described for four motile marine bacteria. Sublethal concentrations of toxic organic (0.001-5 percent, wt/vol) and inorganic (0.0001-0.5 percent, wt/vol) compounds were used as stimuli. The vaiability of the organisms over the range of concentrations used was determined by incubating a known concentrations of cells in each concentration of chemical for 10 min. Numbers were determined by serial dilution in artificial seawater and plating on seawater-nutrient agar. The positive chemotactic responses were reversed by the addition of the sublethal concentrations of the toxic chemical. The negative chemotactic effect was observed with a wide range of toxicants including heavy metals and hydrocarbons. This phenomenon may be utilized to develop new approaches for control of marine fouling. (Holoman-Battelle)
W74-00658

RESPONSES OF A MIXED PHYTOPLANKTON POPULATION TO NUTRIENT ENRICHMENTS OF AMMONIA AND PHOSPHATE, AND SOME ASSOCIATED ECOLOGICAL IMPLICATIONS,
Freshwater Biological Association, Ambleside (England).
A. B. Viner.
Proceedings of the Royal Society of London, Series B, Vol 183, No 1073, p 351-370, July 3, 1973. 7 fig, 3 tab, 37 ref.

Descriptors: *Cultures, Limiting factors, *Respiration, *Photosynthesis, *Phytoplankton, *Absorption, Nitrogen, Phosphorus, Dissolved oxygen, Carbon, Carbon dioxide, Bioassay, Laboratory studies, On-site tests, Nutrients, Phosphates, Ammonia, Light intensity, Algae, Diatoms, Water quality, Population, Ecology.
Identifiers: *Enrichment, Microcystis aeruginosa, Chlorophyll a, Nitzschia fonticola, Microcystis flos-aquae, Lake George, Uganda.

To test the hypothesis that nitrogen and phosphorus were major elements limiting phytoplankton growth in Lake George (W. Uganda), experiments were carried out in which ammonia-nitrogen and phosphate-phosphorus were added to freshly sampled mixed populations of phytoplankton. Natural, mixed plankton were cultured in conical flasks immersed in a water bath and illuminated. Experiments were also conducted in which culture bottles were suspended in the lake. Chlorophyll a was determined by methanol extraction, carbon by conversion to CO_2, and oxygen by the Winkler procedure. Nitrogen starvation was inferred from the very high uptake rate of ammonia in the light and also substantial uptake in the dark, implying a reserve of photosynthate unused for growth purposes. Phosphate enhanced these responses. The addition of both ammonia and phosphate increased the respiratory rate of the algae, but not the photosynthetic rate until after a period when growth of the phytoplankton must have occurred. There is some evidence that such growth did not occur until after the second day of experimentation and the responses before this time reflected the demands of the algae in the lake at the time of sampling. Repeated experiments over a period of 6 months showed similar patterns of response to enrichment although quantitatively they were different. A number of ecological implications of the results are discussed. (Holoman-Battelle)
W74-00665

DEVELOPMENT OF A SELECTIVE ALGAECIDE TO CONTROL NUISANCE ALGAL GROWTH,
Dow Chemical Co., Freeport, Tex. Texas Div.
For primary bibliographic entry see Field 05G.
W74-00702

ALGAE ABSTRACTS, A GUIDE TO THE LITERATURE, VOLUME 1 TO 1969; VOLUME 2, 1970-1972.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.

IFI/Plenum: New York 1973. Vol I, 585 p; Vol II, 693 p. $65.00 per set.

Descriptors: *Bibliographies, *Algae, *Abstracts, *Eutrophication, Algal control, Analytical techniques, Bioassay, Biodegradation, Cyanophyta, Nutrients, Lakes, Nitrogen, Phosphorus, Phytoplankton, Sewage, Water pollution effects, Waste water treatment, Documentation, Indexing.

This is the first in a series of bibliographies on water resources and pollution published by IFI/Plenum Data Corporation in cooperation with the Water Resources Scientific Information Center (WRSIC). It is produced wholly from the information base comprising material abstracted and indexed for Selected Water Resources Abstracts. The bibliography is divided into volumes according to the publication dates of the source documents. Volume 1 contains 569 abstracts covering publication dates up to and including 1969; Volume 2 contains 730 abstracts covering the years 1970 to 1972. The material included in this bibliography represents computer selections based on the presence of a form of the word 'alga' somewhere in the referenced citation. Substantively, the material typifies WRSIC's 'centers of competence' approach to information support of the Office of Water Resources Research (OWRR) of the Department of the Interior. Most of the references in this bibliography are the work of the center of competence on eutrophication at the University of Wisconsin.
W74-00704

EFFECTS OF ELEMENTAL PHOSPHORUS ON MARINE LIFE.
Fisheries Research Board of Canada, Halifax (Nova Scotia).

Circular No. 2, November 1972. 313 p. 108 fig, 52 tab, 205 ref, 1 append.

Descriptors: *Phosphorus, *Marine animals, *Marine plants, *Canada, *Water pollution effects, Water pollution control, Mortality, Marine fish, Fisheries, Herrings, Estuaries, Invertebrates,

Toxicity, Salmonids, Lobsters, Oxidation, Water pollution sources, Bottom sediments, Benthos, Animal pathology, Gas chromatography, Fluorides, Soils, Phosphorus compounds, Analytical techniques, Tidal effects, Tracers, Measurement, Bioassay, Dredging, Sculpins, Crabs, Mussels, Monitoring.
Identifiers: *Pacentia Bay (Newfoundland), Elemental phosphorus, 'Red' herring, Cod.

Dead and dying fish were found in the winter and spring of 1969 in Placentia Bay, Newfoundland, coinciding with the opening of a phosphorus plant. While circumstantial evidence implicated plant effluents, direct evidence was lacking. A major coordinated investigation indicated that phosphorus quantities in the effluent were greater than required to kill fish, the most susceptible of which were herring, exhibiting 'red' symptoms. Phosphorus accumulation in the bottom sediments near the effluent outfall was also toxic to fish. The behavior of elemental phosphorus as a pollutant was studied in its decomposition in water, the capacity of the estuary to accept pollutants, and the assimilation of elemental phosphorus by marine organisms assessed. Histology and hematology of 'red' herring and lobsters were conducted. Methods were developed for direct determination of elemental phosphorus by gas-liquid chromatography and direct determination of fluoride in water. The Electric Reduction Company modified its pollution abatement procedures and was reopened after the investigation. (See W74-00706 thru W74-00712) (Auen-Wisconsin)
W74-00705

COEXISTENCE OF A FISHERY AND A MAJOR INDUSTRY IN PLACENTIA BAY,
Fisheries Research Board of Canada, Halifax (Nova Scotia).
D. R. Idler.
In: 'Effects of Elemental Phosphorus on Marine Life,' Fisheries Research Board of Canada, Research and Development, Halifax, Nova Scotia, Circular No. 2, November 1972, p 1-6. 8 fig.

Descriptors: *Water pollution effects, *Fisheries, *Industries, *Marine fish, *Phosphorus, *Canada, Ammonia, Fluorides, Fishkill, Magnesium compounds, Toxicity, Herrings, Lobsters, Sea water, Trout, Salmonids, Hydrogen ion concentration, Sulfur compounds, Bottom sediments, Pollution abatement, Dredging, Waste water treatment, Social aspects.
Identifiers: *Placentia Bay (Newfoundland), Cod, 'Red' herring, Fluorapatite, Elemental phosphorus.

The Placentia Bay, Newfoundland fishery, principally for herring, cod, and lobsters, showed extensive fish mortalities, coinciding with the opening of a phosphorus plant. Plant effluents included so-called 'phossy' water containing phosphorus, cyanide and ammonium ion; water from the pelleting plant contained the majority of the fluoride; and water from the dryers contained sulphur dioxide. The fluosilicic acid emitted required neutralization; this fact coupled with high fluoride content and large volume of the effluent and possibly seawater pump corrosion, resulted in incomplete neutralization. Immobilization of fish by low pH offers one explanation why fish did not avoid exposure to phosphorus. Phosphorus quantities in the effluent were far greater than those required to kill the species. Even if the effluent discharge was halted, the accumulation of phosphorus on the bottom was sufficient to kill fish in that vicinity. Also sulphur dioxide and ammonia in effluent were toxic because of the relatively large quantities present. Bioassays were carried out on bottom sediments, confirming laboratory studies that bottom sediments were extremely toxic to fish. The phosphorus plant was reopened after the toxic substances in its effluent were treated and retained on the premises. (See also W74-00705) (Jones-Wisconsin)
W74-00706

DECOMPOSITION OF PHOSPHORUS IN WATER,
Memorial Univ. of Newfoundland, St. John's. Dept. of Chemistry.
E. Bullock, and M. J. Newlands.
In: 'Effects of Elemental Phosphorus on Marine Life,' Fisheries Research Board of Canada, Research and Development, Halifax, Nova Scotia, Circular No. 2, November 1972, p 55-56.

Descriptors: *Degradation (Decomposition), *Phosphorus, *Sea water, *Canada, Anions, Oxidation, Solubility, Analytical techniques, Colloids, Suspension.
Identifiers: Elemental phosphorus, *Placentia Bay (Newfoundland), Long Harbour (Newfoundland).

Investigation of the pollution problem in Long Harbour of Placentia Bay, Newfoundland, called for cooperative research involving many agencies and independent bodies. Studies of fundamental problems, estimation of low concentrations of elemental phosphorus and oxidation of elemental phosphorus in solution or suspension were undertaken. Elemental phosphorus was analyzed by a modification of the method of the Electric Reduction Company of Canada Limited. The best results gave suspensions containing up to 200 ppm elemental phosphorus. The half-life for the oxidation of white phosphorus in suspension shows that it would take several days to reduce the elemental phosphorus concentration of ERCO effluent to a value below tolerance level values for humans. It is likely that the TLV for fish is considerably smaller than for humans since body weight and rate of respiration are broth major factors. Moreover, studies have made it clear that very little dilution occurs in Long Harbour. It follows that no elemental phosphorus should be emitted from the ERCO plant. The plant has installed a new treatment plant in order to continue operations. (See also W74-00705) (Jones-Wisconsin)
W74-00707

CAPACITY OF AN ESTUARY TO ACCEPT POLLUTANTS,
Bedord inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
R. W. Trites.
In: 'Effects of Elemental Phosphorus on Marine Life,' Fisheries Research Board of Canada, Research and Development, Halifax, Nova Scotia, Circular No. 2, November 1972, p 57-69. 11 fig, 8 ref.

Descriptors: *Estuaries, *Pollutants, *Self-purification, *Measurement, Tidal effects, Model studies, Solubility, Dispersion, Diffusion, Circulation, Bays, Mixing, Winds.
Identifiers: Flushing rates.

Concentration of pollutant at any given point in the environment will depend upon rate and concentration of effluent being discharged, decomposition rate of the pollutant, and dilution rate due to mixing with 'clean' water. Attention is focused on dilution rate. The rate of flushing will depend upon the strength of tidal and non-tidal currents, wind, wave, and swell action, precipitation and fresh water discharge and physical configuration of the area involved. If the response of the water to these forces were understood, the flushing time could be computed in principle and the concentration and distribution of pollutant predicted for any given situation. In practice, a semi-empirical approach must be taken. In many coastal embayments where pollution or potential pollution exists, the circulation and diffusion processes are the result of a number of factors, and frequently no single factor is predominant at all times. Meteorological parameters may frequently be dominant. Experimental tracer techniques, combined with measurements taken over various conditions, appear the most useful approach to the problem. It is probably wise to consider dilution rates at times to be an order of magnitude less than those measured under field conditions. (See also W74-00705) (Jones-Wisconsin)
W74-00708

AN ASSESSMENT OF THE ASSIMILATION OF ELEMENTAL PHOSPHORUS BY NEWFOUNDLAND MARINE ORGANISMS IN THE 1969 POLLUTION PROBLEM AND IN 1970 MONITORING OPERATIONS,
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
R. G. Ackman, R. F. Addison, and J. Hingley.
In: 'Effects of Elemental Phosphorus on Marine Life,' Fisheries Research Board of Canada, Research and Development, Halifax, Nova Scotia, Circular No. 2, November 1972, p 71-109. 3 fig, 18 tab.

Descriptors: *Phosphorus, *Marine fish, *Water pollution effects, *Analysis, Monitoring, *Canada, Fishkill, Herrings, Mortality, Fish diseases, Sea water, Bioassay, Lobsters, Crabs.
Identifiers: Elemental phosphorus, *Placentia Bay (Newfoundland), Long Harbour (Newfoundland), 'Red' herring, Cod.

Results of analyses on field specimens of fish and other marine organisms from Placentia Bay, Newfoundland, for elemental white (or yellow) phosphorus are reported. The problem was delineated in 1969, and more controlled sampling was done in 1970. Determination of phosphorus was carried out by gas-liquid chromatography. On a wet weight basis one ppb was detected and measured, and, by concentrating the organic solvent by a factor of 10, detection limit was 0.1 ppb or better. Herring are much more susceptible than other fish to hemorrhagic effects from elemental phosphorus poisoning. The conclusion reached in late 1969 concerning herring was that fish accumulating 500-1000 ppb of elemental phosphorus in the flesh died rapidly at or near the scene of exposure. Exposure leading to lesser accumulations, 50-100 ppb, may have permitted herring to travel considerable distances before death. The year 1970 opened with great concern about 'red' herring from the commercial fishery in Southern Harbour. It is not an unreasonable supposition that more than 40 ppb elemental phosphorus in herring flesh is lethal within one or two days. Studies were also made on cod, sculpin, flatfish, flounder, crab, lobster, salmon, smelt, and miscellaneous fish. (See also W74-00705) (Jones-Wisconsin)
W74-00709

OBSERVATIONS ON MORTALITIES OF BENTHIC ORGANISMS AFTER CONTAMINATION OF THE BOTTOM OF LONG HARBOUR, PLACENTIA BAY, NEWFOUNDLAND WITH ELEMENTAL PHOSPHORUS,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
D. L. Peer.
In: 'Effects of Elemental Phosphorus on Marine Life,' Fisheries Research Board of Canada, Research and Development, Halifax, Nova Scotia, Circular No. 2, November 1972, p 181-186. 2 fig, 3 tab, 4 ref.

Descriptors: *Phosphorus, *Mortality, *Benthic fauna, *Bottom sediments, *Water pollution effects, *Canada, Mussels, Fishkills, Toxicity, Amphipoda, Particle size, Analytical techniques.
Identifiers: Elemental phosphorus, *Long Harbour (Newfoundland), *Placentia Bay (Newfoundland), Sand dollars, Sea anemone.

Following opening of an elemental phosphorus producing plant in Long Harbour, Placentia Bay, Newfoundland, divers observed dead fish upon the bottom throughout Long Harbour. Mortalities were confined to water less than 18 m in depth. Sediments were investigated for possible toxic

materials and mortalities of benthic invertebrates. Where depth permitted, sediment samples were taken by divers inserting a plastic tube. When depths were over 13 m the sediment was cored after being brought up in a bottom grab. Which sediment type or size fractions contained the highest proportion of elemental phosphorus was determined. Because of color, consistency, and melting point, it was concluded the material found was elemental (yellow) phosphorus. Apparently a large amount of the phosphorus in the Long Harbour sediment was in lumps of pure phosphorus less than 1/2 mm in diameter. There was some visual evidence of selective mortality among benthos. Live mussels were found within 300 m of the effluent pipe while scallops within this area were all dead. With some exceptions, the benthic infaunal community appeared normal in terms of mean wet weight numbers, and species composition compared to similar depth and substrate in a relatively non-polluted area. (See also W74-00705) (Jones-Wisconsin)
W74-00710

SYMPTOMS OF 'RED' HERRING IN RELATION TO THE MASS MORTALITIES IN PLACENTIA BAY, FEBRUARY--APRIL 1969,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
J. H. C. Pippy, V. M. Hodder, and L. S. Parsons.
In: 'Effects of Elemental Phosphorus on Marine Life, 'Fisheries Research Board of Canada, Research and Development, Halifax, Nova Scotia, Circular No. 2, November 1972, p 187-191. 1 fig, 9 ref.

Descriptors: *Herrings, *Phosphorus, *Mortality, *Toxicity, Industrial plants, *Canada, Pathology, Fishkill, Water pollution effects, Fish diseases.
Identifiers: *'Red' herring symptoms, *Placentia Bay (Newfoundland).

During February to April 1969 mass mortalities of herring occurred in Placentia Bay, Newfoundland. Dead and drying fish exhibited a bright red skin coloration. To determine the cause, autopsies were performed on both 'red' and normal herring obtained during the field investigations. Many herring were examined grossly for evidence of abnormal quantities of parasites and of abnormal changes in appearance of external and internal organs and tissues. Comparison of normal blood with that of 'red' herring revealed extensive destruction of erythrocytes. Fungi were ruled out as possible cause of the mortalities. Samples from extensive phytoplankton blooms in the northern half of Placentia Bay during mid-and late April did not reveal any form of toxin-producing algae, nor did high concentrations of the phytoplankton have any effect on sticklebacks held in aquaria. It was concluded that the mass mortalities of herring were caused by the presence of elemental phosphorus in the bay. Those which died in the contaminated area very likely represent acute cases of hemolysis, whereas those which survived and exhibited green intestines when caught some time later probably represent chronic cases. (See also W74-00705) (Jones-Wisconsin)
W74-00711

ANALYSIS OF ELEMENTAL PHOSPHORUS AND SOME OF ITS COMPOUNDS BY GAS CHROMATOGRAPHY,
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
R. F. Addison.
In: 'Effects of Elemental Phosphorus on Marine Life, 'Fisheries Research Board of Canada, Research and Development, Halifax, Nova Scotia, Circular No. 2, November 1972, p 233-237. 2 fig, 19 ref.

Descriptors: *Analytical techniques, *Phosphorus, *Phosphorus compounds, *Gas chromatography, Sediments, Absorption, Plant tissues, Toxicity, Marine plants, Marine animals, Stability, *Canada, Bioassay, Pollutant identification.
Identifiers: Elemental phosphorus, *Placentia Bay (Newfoundland).

Results of some short term toxicological and chemical studies initiated by extensive herring mortality in Placentia Bay, Newfoundland, are reviewed. Direct determination of elemental (yellow) phosphorus by gas-liquid chromatography is described. The method allows the specific detection and estimation of elemental phosphorus in the subnanogram range in samples, including sediments, water, and plant or animal tissues. The approach was to partially isolate elemental phosphorus by extraction with a suitable organic solvent such as benzene or isooctane. An extract aliquot was then subjected to gas-liquid chromatography on a non-polar column. Elemental phosphorus was eluted within a few minutes of injection and measured in a P-sensitive and P-specific detector. Gas-liquid chromatographical methods for detection of hypophosphite, phosphite, and phosphate, in the nanogram range, as their trimethylsilyl derivatives, are discussed. The products of elemental oxidation in water were studied using these procedures. Toxicity of elemental phosphorus to marine organisms and its uptake into plant and animal tissues is reviewed. Something of how elemental phosphorus behaves in aqueous and in biological systems is now known and its toxicity to marine organisms well defined. However, the major toxicological question of how phosphorus kills is still unsolved. (See also W74-00705) (Jones-Wisconsin)
W74-00712

NITROGEN FIXATION BY ANABAENA CYLINDRICA. I. LOCALIZATION OF NITROGEN FIXATION IN THE HETEROCYSTS,
California Univ., San Diego, La Jolla. Dept. of Chemistry.
N. M. Weare, and J. R. Benemann.
Archiv fur Mikrobiologie, Vol 90, No 4, p 323-332, 1973. 4 fig, 39 ref.

Descriptors: *Nitrogen fixation, *Anabaena, *Cytological studies, Oxygen, Light, Carbon dioxide, Inhibition, Cyanophyta.
Identifiers: *Anabaena cylindrica, *Heterocysts, Dark.

The experiments described indicate that heterocysts are the main, probably exclusive, sites of nitrogen fixation in both air- and N2-grown cultures of Anabaena cylindrica. The blending experiments indicate that filament breakage occurs preferentially at the junction between vegetative cells and heterocysts, and that breaking this connection results in a loss of nitrogenase activity. Correlation of filament breakage at the heterocysts with loss of nitrogen fixation activity was found with both air- and N2-grown cultures and under aerobic and anaerobic blending and assay conditions. The kinetics of the loss of nitrogen fixation activity during aerobic dark incubation and its recovery after transfer to the light can be explained in terms movement of reductant- and ATP-generating supplies from the vegetative cells to heterocysts. The data support the view that in the dark aerobic assays ATP was the limiting substrate of nitrogenase, whereas after three hours of dark aerobic incubation the reductant supply became limiting. In a hypothetical model shown vegetative cells provide reduced carbon compounds to the heterocysts which utilize them to generate NADPH which is then able to reduce nitrogenase through ferredoxin. (Jones-Wisconsin)
W74-00713

NUTRIENT LOADING FROM A SEPARATE STORM SEWER IN MADISON, WISCONSIN,
Wisconsin Univ., Madison. Water Chemistry Program.
J. W. Kluesener, and G. F. Lee.
International Biological Program, Deciduous Forest Biome, Lake Wingra Study, (Mimeo) (1972), 30 p. 16 fig, 3 tab, 14 ref. EPA Project 16010 EHR.

Descriptors: *Eutrophication, *Water pollution sources, *Storm drains, *Urban runoff, *Wisconsin, Storm water, Nutrients, Rainfall, Watersheds (Basins), Nitrogen, Phosphorus, Suspended solids, Ammonia, Nitrates, Leaching, Vegetation, Fertilizers, Roads, Litter, Fallout, Organic matter.
Identifiers: *Nutrient sources, Madison (Wis.), *Lake Wingra (Wis.).

Potential importance of nutrient loading from separate storm sewers prompted study of relationship between rainfall and runoff into Lake Wingra, Wisconsin. Nutrient concentration variability throughout a storm and for different seasons, nutrient loading annually, potential nutrient sources, sampling requirements to quantify loadings, and significance relative to other nutrient sources were evaluated. Approximately 15% of rainfall appears as surface runoff. Nutrient and suspended solids concentrations were usually greatest during early stages of runoff events, decreasing with time. Phosphorus concentrations were greatest in spring and fall; nitrogen concentrations were greatest in spring. Rainfall appeared the major source of inorganic-N. Phosphorus generally resulted from accumulated litter and possibly automotive exhaust. Barring availability of suitable flow proportioned sampler, the next most appropriate sampling procedure would be to characterize the particular basin by collecting flow and chemical data over fairly short time intervals for several storms. Samples should continue to be collected over the same short time intervals but flow data and historical relationship between flow and concentration should be used judiciously to select an appropriate number of samples for chemical analyses. Approximately 80% of the total phosphorus and 35-40% of the total nitrogen influent to Lake Wingra arises from urban runoff. (Jones-Wisconsin)
W74-00716

GLUTAMINE SYNTHETASE OF THE NITROGEN-FIXING ALGA ANABAENA CYLINDRICA,
Dundee Univ. (Scotland). Dept. of Biological Sciences.
M. W. N. Dharmawardene, A. Haystead, and W. D. P. Stewart.
Archiv fur Mikrobiologie, Vol 90, No 4, p 281-295, 1973. 11 fig, 9 tab, 37 ref.

Descriptors: *Cytological studies, *Enzymes, *Nitrogen fixation, *Anabaena, Mode of action, *Cyanophyta, Metabolism.
Identifiers: *Glutamine synthetase, *Anabaena cylindrica, Biosynthesis.

Glutamine synthetase characteristics in Anabaena cylindrica were determined to demonstrate whether it possesses features of bacterial glutamine synthetase making it most efficient as an assimilatory mechanism under low ammonia concentrations and whether in blue-green algae it is subject to the rigorous control mechanisms demonstrated in some other systems. Presence of such a regulatory system could imply a central role for this molecule in nitrogen metabolism of the group. High levels of glutamine synthetase are present in aerobically grown N2-fixing cultures. The enzyme is soluble, has a pH optimum of 6.5-7.5 and a temperature optimum at 30-40C. Partially purified preparations are stable in air at 5C for at least three days. Enzyme activity is regulated at several levels: possibly by repression and derepression of the enzyme in response to ammonia level; by variation in the manganese ions to ATP ratio with optimum activity at a 1:1 ratio; and by feedback inhibition, possibly cumulative. Evidence suggests absence of a covalent enzyme modification of the type found in E. coli. Its levels are almost twice as high on a protein basis in the

heterocysts as in the vegetative cells. (Jones-Wisconsin)
W74-00717

DETERGENT PHOSPHATE AND EUTROPHICATION IN AUSTRALIA,
J. M. Hartwell.
Report March 1973. 23 p. 96 ref.

Descriptors: *Detergents, *Phosphates, *Eutrophication, *Australia, Waste water treatment, Europe, Limiting factors, Sea water, Nitrilotriacetic acid, Canada, United States, Great Lakes, Public health, Carbon, Phosphorus, Mitrogen.
Identifiers: Sweden, Germany, Switzerland, United Kingdom.

Water pollution problems in Australia are compared with those in the United States, Canada, Sweden, Germany, Switzerland, and United Kingdom. Australia, even though an industrial nation and not abundantly supplied with water, has few eutrophication problems. Although there are shortcomings in sewerage facilities, the other contributing factors, large inland lakes close to urban and industrial centers, are absent. Some controversy remains regarding the relative importance of the various nutrient elements in limiting algal growth. The idea of a single element limiting algal growth in all waters under all conditions is no longer acceptable. In waters of low primary productivity, many elements, frequently phosphorus may be limiting, but in heavily polluted, eutrophic waters phosphorus is always available in excess, and organic carbon and nitrogen are most often limiting. Arguments regarding the usefulness of banning phosphates from detergents have been largely superseded now that it is known that simple chemical precipitation during primary sewage treatment removes far more phosphate and at lower cost than any restrictions on detergent formulations. The suggestion is made that the study of cultural eutrophication in Australia should be the work of a permanent government committee under the Federal Department for the Environment and Conservation. (Jones-Wisconsin)
W74-00718

A MATHEMATICAL MODEL OF THE NUTRIENT DYNAMICS OF PHYTOPLANKTON IN A NITRATE-LIMITED ENVIRONMENT,
Utah Water Research Lab., Logan.
W. J. Grenney, D. A. Bella, and H. C. Curl, Jr.
Biotechnology and Bioengineering, Vol 15, No 2, p 331-358, 1973. 9 fig, 2 tab, 34 ref.

Descriptors: *Phytoplankton, *Mathematical models, *Nitrates, *Absorption, Cytological studies, Nitrogen, Growth rates, Plant physiology, Kinetics, Cultures.
Identifiers: *Intracellular nitrogen storage, *Luxury uptake, Batch cultures, Chemostat cultures.

A three-compartment mathematical model is presented which reparsents a phytoplankton population having the capability to store nitrogen in a nitrate-limiting environment. Growth rates are represented by saturation kinetics based on concentrations in intracellular nutrient pools. The model distinguishes three forms of intracellular nitrogen to provide a conceptually realistic means of describingnutrient flow through a biological system and can be used as part of a larger model in investigating mechanisms associated with nutrient limitation and recycling in natural environments to demonstrate the changes which may occur in the nitrogenous constituents of a phytoplankton population with time and environmental conditions. It can quantitatively represent phytoplankton growth dynamics observed in chemostat experiments. It also has been shown to, at least qualitatively, represent the temporal variations in intracellular nitrogen composition of phytoplankton populations in chemostat and batch experiments. Some problems encountered in estimating parameters and applying a one-compartment Monod model can be explained by the intracellular storage phenomenon. (Jones-Wisconsin)
W74-00720

RESPONSE OF AQUATIC LIFE TO SALINITY, TEMPERATURE, DISSOLVED OXYGEN, AND WATER FLOW,
California Univ., Davis. Dept. of Water Science and Engineering.
A. W. Knight, and R. W. Brocksen.
In: University of California-Davis Water Resources Center Annual Report No 25, ; 15-25, 1972. 3 fig, 2 tab.

Descriptors: *Fish food organisms, *California, *Opossum shrimp, *Striped bass, Salinity, Temperature, Dissolved oxygen, Flow, Bioassay, Estuaries, Respiration, Vitamins, Juvenile fish, Growth rates, Metabolism, Detritus, Diatoms, Fish diets, Fish physiology.
Identifiers: *Sacramento-San Joaquin Delta estuary.

Bioassay techniques were conducted to determine the conditions of temperature and salinity appropriate for the survival of the opossum shrimp (Neomysis awatschensis), an important food source for young striped bass. Since conditions of the Sacramento-San Joaquin Delta estuary are changing and the water may become saline with future diversions it is important to ascertain the response of Neomysis to increased salinity. This study used variations in respiration as a salinity response measure. The bioassay procedure was based on the quantal response in a series of salinity concentrations along a gradient of temperatures. The opossum shrimp resides in the Delta at salinities ranging from freshwater to 30% seawater. Changes in oxygen consumption were recorded over a salinity range of 5 to 70% seawater and in temperatures ranging from 6 to 21C. The respiratory metabolism of juvenile striped bass (Morone saxatilis) was measured at five water temperatures; 16C appears to be the thermal optimum in terms of energetic costs of metabolism. The hemoglobin content of the blood and the quantity of fat stored in the liver were studied as an index to some physiological parameters in analyzing the effects of temperature, salinity and chemical toxicants on the striped bass. (See also W74-14370) (Auen-Wisconsin)
W74-00721

ON THE EFFECT OF POLLUTION ON SURFACE WATERS,
J. Turoboyski.
Gospodarka Wodna, Vol 30, No 1-2, p 129-138, 1970. 13 ref.

Descriptors: Surface waters, *Sewage treatment, *Water pollution effects, *Salinity, Sulfates, Eutrophication, Nitrates, Phenols, Toxins, *Heavy metals, Salts, Chlorides, Chromium, Lead, Industrial wastes, *Thermal pollution, Trophic level, Primary productivity, Copper.
Identifiers: *Poland (Vistula River).

Present treatment of municipal and industrial sewage, in spite of removing the most dangerous pollutants, proves insufficient in certain cases, causing mineralization of Polish rivers. Basic pollutional aspects are salinity, toxicity, and warming of water. Pollution from salts not constituting algal food, sensu stricto, from both municipal and industrial sewage and ground waters from mines is well known. Since sewage purification from excessive salinity by physical and chemical methods is expensive and not yet feasible on a large scale, salinity will apparently increase with industrial development and growing river pollution. Methods exist for removal of salts (with wide ranging toxicities) caused by heavy metals in sewage treatment plants but the process is not adequately carried out. Certain quantities are discharged into rivers and they are not subject to self-purification processes. Artificial heating of water reservoirs, caused by cooling water discharges from power plants and steel mill wastes, and other industries, increased within the last few years. Heating by even 1 to 2C above normal, on a permanent basis, may induce certain biological changes. (Jones-Wisconsin)
W74-00722

THE 'PALMELLOID' STATE IN A BLUE--GREEN ALGA, ANABAENA SP. I. PRELIMINARY REPORT,
California State Coll., Pa. Dept. of Biological Sciences.
S. C. Bausor, and J. L. Agona.
American Journal of Botany, Vol 60, No 3, p 223-227, 1973. 3 fig, 1 tab, 21 ref.

Descriptors: *Cytological studies, *Plant morphology, *Cyanophyta, *Anabaena, Metabolism, Cultures.
Identifiers: *Palmelloid state.

An Anabaena, in the laboratory, had the unusual habit of going into a chroococcoid (palmelloid) phase of development. Observations of its terrarium habitat and its culture are reported in an effort to analyze the meaning of the palmelloid state in general. The terrarium growth was characterized by an exceedingly slimy greenish spread, without symmetical form. Continued growth of these masses and new conversions of filaments resulted in the amorphous slime covering. Developments of the alga in synthetic media are described. Early growth of newly transferred trichomes of this Anabaena strain in cultures showed no evidence of palmelloid development, however, the palmelloid phase reappeared in old cultures. This late appearance of the palmelloid state indicates a changed environment that could involve autointoxication, depletion of carbon dioxide, and change in reaction (pH) of the medium. Since the change involves excessive slime production, whatever the immediate cause, it seems probable that the effect is a change in metabolic gene action related to slime production. It is not formed during rapid growth which seems to favor chain development. The palmelloid state evidently signifies a change in metabolic balance, the unbalanced growth favoring slime production at low metabolic rates. (Jones-Wisconsin)
W74-00723

ALGAL RESPONSE TO GETERGENT PHOSPHATE LEVELS,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
D. E. Francisco, and C. M. Weiss.
Journal of Water Pollution Control Federation, Vol 45, No 3, p 480-489, 1973. 5 fig, 6 tab, 15 ref.

Descriptors: *Algae, *Detergents, *Phosphates, *Eutrophication, Waste water (Pollution), Bioassay, Waste water treatment, Tertiary treatment, Surveys, Laundering.
Identifiers: Non-phosphorus detergents.

The ability of treated (primary, secondary, and tertiary) domestic wastewater containing phosphate and nonphosphate detergents to support algal growth in receiving waters was determined by algal bioassay. Wastewaters containing phosphate and nonphosphate detergents were collected from a test population. In 12 out of 18 cases, phosphorus detergent wastewater allowed the same growth in algal assay as the nonphosphorus detergent wastewater. Tertiary treatment for phosphorus removal resulted in significantly less growth than secondary treatment. The tertiary-treated phsophorus detergent wastewater allowed significantly greater growth than the nonphosphorus detergent wastewater at a 2% con-

centration. The tertiary-treated nonphosphorus detergent wastewater allowed the same growth as the lake controls at all dilutions. At 1 and 2%, tertiary-treated phosphorus detergent wastewater allowed greater growth than one of the lake controls. Simply removing detergent phosphates from wastewater would have no practical significance in eutrophication control except in those cases where a lake is very strongly phosphorus-limited and wastewater is the principal source of influent phosphorus. Tertiary phosphorus removal to perhaps extremely low values (depending on dilution) can minimize nutrient enhancement of receiving waters. (Jones-Wisconsin)
W74-00724

THE EFFECTS OF STRIP MINING UPON NAVIGABLE WATERS AND THEIR TRIBUTARIES: DISCUSSION AND SELECTED BIBLIOGRAPHY.
Pittsburgh Univ., Pa. Graduate Center for Public Works Administration.

Available from the National Technical Information Service as AD-749 802, $3.00 in paper copy, $1.45 in microfiche. Prepared for Civil Works Directorate, Army Corps of Engineers, July 1972. 94 p. 1 fig, 10 tab, 278 ref. D+CW73-72-C-0048.

Descriptors: *Strip mine wastes, *Navigable waters, *Tributaries, *Bibliographies, Water pollution effects, Mine drainage, Runoff, Sedimentation, Water chemistry, Streams, Spoil banks, Land reclamation, Environmental effects, Erosion, Water quality, Legislation, Acid mine water, Euthrophication, Phosphates, Hydrogen ion concentration, Water utilization, Pollution abatement, Mining.

The principal effects of strip mining on waterways include alterations in runoff and sedimentation, water chemistry, stream ecology, and water utilization. The two principal approaches to abatement of strip mine effects are land reclamation and treatment of contaminated discharges. Land reclamation treats many of the effects of strip mining while treatment considers primarily the mine drainage problem. Strip mined land can be regraded and revegetated to control runoff and erosion and to reduce the formation of acid or highly mineralized drainage. Mine discharges which can be localized can be treated chemically or physically to remove suspended and dissolved solids. To reduce the concentrations of pollutants in streams, impoundment or dilution may be utilized. The most direct control is limitation by location and extent of strip mining. The several treatment methods, considered in the literature and in some cases applied as full or pilot scale treatment plants, include neutralization, distillation, ion exchange, reverse osmosis, electrodialysis and the physical processes of dilution, sedimentation and impoundment. A comprehensive bibliography of selected references is included, especially dealing with coal strip mining. (Jones-Wisconsin)
W74-00725

ENVIRONMENTAL CONTROL OF GAMETOGENESIS IN LAMINARIA SACCHARINA. II. CORRELATION OF NITRATE AND PHOSPHATE CONCENTRATIONS WITH GAMETOGENSIS AND SELECTED METABOLITES,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
S. I. Hsiao, and L. D. Druehl.
Canadian Journal of Botany, Vol 51, No 5, p 829-839, 1973. 5 fig, 2 tab, 29 ref.

Descriptors: *Reproduction, *Marine algae, *Environmental control, *Nitrates, *Phosphates, Metabolism, Plant growth, Plant morphology, Sea water.
Identifiers: *Laminaria saccharina, *Gametogenesis.

Using a synthetic seawater medium under optimal light and temperature conditions, the gametophyte growth, morphology, gametogenesis, and metabolites of Laminaria saccharina were studied in different concentrations of nitrate and phosphate in exenic culture. Nitrate and phosphate were required for the various stages of gametophyte development and gametogenesis. Meiospore germination was stimulated with increasing phosphate concentrations under optimal concentrations of nitrate, but inappropriate combinations of nitrate and phosphate concentrations produced an adverse effect. The optimal concentrations of nitrate and phosphate in ASP 2M medium for growing L. saccharina meiospores into gametophytes were 588.3 microgram-atoms nitrate nitrogen per liter and 15 microgram-atoms phosphate phosphorus per liter. The amount of nitrogen available to L. saccharina would determine the amount of lipid accumulation, since nitrogen deficiency limits growth, and causes photosynthetic activity to be directed to lipid synthesis. Nutrient concentrations giving rise to the greatest fertility also gave rise to the highest ratios of RNA/DNA and protein/RNA. Antheridial production occurred over a wider range of nitrate and phosphate concentrations than oogonial production. Percentage fertility was greater for the male gametophyte. This indicated that the female gametophyte was the limiting agent in sexual fusion. (Jones-Wisconsin)
W74-00726

CONTRIBUTIONS TO THE KNOWLEDGE OF BIOGENIC ELEMENTS AND PHTOPLANKTON ASSOCIATIONS DYNAMICS IN FRASINET POND DURING NOVEMBER 1969-NOVEMBER 1970, (IN RUMANIAN),
I. Chiosila, and A. Schneider.
Bul Cercet Piscic. Vol 30, No 3/4, p 45-62. 1971. (English summary).
Identifiers: Aphanizomenon-Flos-Aquae, *Biogenic elements, Chlorophyta, Chrysophyta, Cyanophyta, Nitrogen, Organic, Phosphorus, *Phytoplankton, Ponds, Reeds, *Romania (Mostistea River), Season, Zooplankton, Hydrogen ion concentration.

Relations between the dynamics of temperature, pH, N, P and organic matter and phytoplankton dynamics are established in Frusinet pond (on river Mostistea, Romania). Phytoplankton biomass varied depending on the season; generally, the physicochemical regime favored phytoplanktonic and zooplanktonic community development. Highest values of remnant phytoplankton frequency were recorded near the end of summer or early fall (about 7.03 mm3/1 in Aug. for Aphanizomenon flos-aquae). The richest phytoplankton was found near the pond center, followed by the reed plot zone and the littoral zone. The Cyanophyta, Chrysophyta, and Chlorophyta had nearly equal frequencies of 28.2%, 33.1% and 32.5%, respectively; Pyrrophyta showed weak development.--Copyright 1973, Biological Abstracts, Inc.
W74-00727

INHIBITION OF OXYGEN EVOLUTION IN VOLVOX GLOBATOR BY CULTURE FILTRATES FROM PANDORINA MORUM,
Kentucky Univ., Lexington. Dept. of Botany.
D. O. Harris.
Microbios, Vol 3, No 9, p 73-75, 1971. 1 tab, 8 ref. OWRR A-018-KY (5).

Descriptors: *Algal control, *Algal toxins, *Inhibitors, Cultures, Chlorophyta, Photosynthesis, Respiration, Biochemistry.
Identifiers: *Pandorina morum, *Algal growth inhibitors, *Volvox globator.

A complex system of growth inhibition had been observed in the family Volvocaceae (colonial green flagellates). Culture filtrates from eleven different genera and species had been surveyed and it was found that the culture filtrate from Pandorina morum produced the most effective toxin, inhibiting most members of the group while Volvox globator proved to be the most sensitive. An examination was made of the effects of the inhibitor produced by Pandorina morum on photosynthesis and respiration. The first firm evidence of a possible mode of action of an algal inhibitor, apparently a specific inhibitor of photosynthesis, is presented. Cultures of strains of Volvox globator and Pandorina morum were grown aseptically. The clark electrode was employed to measure the rate of oxygen consumption and evolution. Respiration was measured as oxygen consumption and photosynthesis was measured as oxygen evolution. It was observed that one hour exposure of Volvox to culture filtrates of Pandorina resulted in a 65% reduction in the oxygen evolution rate which increased to 91% after 12 hour exposure to the inhibitor. Respiration as measured by oxygen consumption was unaffected. (Jones-Wisconsin)
W74-00728

NITROGEN FIXATION BY OSCILLATORIA (TRICHODESMIUM) THIEBAUTII IN THE SOUTHWESTERN SARGASSO SEA,
Woods Hole Oceanographic Institution, Mass.
E. J. Carpenter.
Deep-Sea Research, Vol 20, No 3, p 285-288, 1973. 2 tab, 14 ref.

Descriptors: *Nitrogen fixation, *Marine algae, *Cyanophyta, Photosynthesis, Analytical techniques, Nitrogen.
Identifiers: *Oscillatoria thiebautii, *Sargasso Sea, Acetylene reduction technique.

Oscillatoria (Trichodesmium) thiebautii, a planktonic blue-green alga, in Atlantic and Indian Oceans appears to fix atmospheric nitrogen, but at low rates relative to its total nitrogen budget. The importance of nitrogen fixation to Oscillatoria was investigated and data collected with the acetylene reduction technique in the southwestern Sargasso Sea presented. Concentrations of nitrate, nitrite, ammonia, and phosphate showed little variation from station to station. Nitrate and nitrite were relatively low. Two forms of Oscillatoria were collected, fusiform and spherical colonies and both fixed nitorgen. According to the characteristics of planktonic marine Oscillaotria, noted by Sournia, both fusiform and spherical colonies belong to O. thiebautii. Nitrogen fixation can be a significant source of nitrogen for Oscillatoria, permitting a doubling of cellular N at a minimum of 12 days and at an average rate of once every 47 days for all samples that fixed nitrogen. If Oscillatoria has division rates typical of other open ocean phytoplankters, then these data suggest that a large portion of its nitrogen must be obtained from sources other than nitrogen fixation, undoubtedly the uptake of combined N compounds. (Jones-Wisconsin)
W74-00729

ALGAE OF SECONDARY SETTLING TANKS, (IN RUSSIAN),
Kharkov State Univ. (USSR). Dept. of Lower Plants.
For primary bibliographic entry see Field 05D.
W74-00730

PROTECTION OF WATER AGAINST POLLUTION,
A. Chojnacki.
Gospodarka Wodna, Vol 30, No 1-2, p 42-49, 1970. 1 tab, 9 ref.

Descriptors: *Degradation (Decomposition), *Detergents, *Water pollution effects, Industries, United States, Foreign countries, Water treatment, Sewage treatment, Formulation, *Water pollution control.
Identifiers: *Poland, Detergent uses.

Detergent consumption creates new and growing problems of water purity in receiving and potable waters. Detergents contain two basic component groups: superficial-active components, averaging in content about 20% , and auxiliary mineral and organic components, mainly phosphate, carbonate, sulfite, and sodium perborate mixtures. The principal criterion for classification of superficial-active substances is their ability of electrolytical dissociation in water solutions. Synthetic detergents remain unchanged in form in sewage system effluents. Generally, they are either not subject to dissolution or dissolve with difficulty, reaching lakes, rivers, and basins and causing distrubances in water self-purification and deterioration of water quality. Water treatment methods indicate that detergents mainly influence sedimentation, filtration, aeration, and coagulation. Numerous studies and investigations indicate a negative influence of detergents primarily on bacterial flora. It seems that a content of about 0.2 mg/l of superficial-active substances may be the admissible limit for superficial waters. Solutions should be based not on neutralization in sewage and purified water, but on research for new superficial-active products or bacterial flora producing easy biological decomposition of these products. (Jones-Wisconsin)
W74-00731

LET AS A DETERMINANT OF OXYGEN ENHANCEMENT RATIO AND SHAPE OF SURVIVAL CURVE FOR CHLAMYDOMONAS,
Medical Research Council, London (England). Experimental Radiopathology Research Unit.
P. E. Bryant.
International Journal of Radiation Biology, Vol 23, No 3, p 217-226, 1973. 6 fig, 1 tab, 16 ref.

Descriptors: *Cytological studies, *Radiation, *Oxygen, *Irradiation, *Chlamydomonas, Aerobic conditions, Anaerobic conditions, Helium, Mathematical studies.
Identifiers: *LET, *Oxygen-enhancement ratio, Chlamydomonas reinhardii, Deutrons, Neutrons, Electrons.

Radiation quality or LET has been widely recognized as a determinant of oxygen-enhancement ratio for biological materials. These experiments were designed to investigate changes in survival curves and oxygen-enhancement ratio over a range of LET values. The electron beam from the MRC linear accelerator was used as source of low-LET radiation. Cells were exposed to electron beam either while resting on membrane filters or in suspension. Dosimetry for the electron beam was based on a comparison of absorbed doses from this beam with those from the linear accelerator x-ray beam, using the ferrous sulphate method. Survival curves for Chlamydomonas were obtained for radiations having different values of LET alpha or stopping power. Irradiations were performed under either aerobic or anoxic conditions. Survival curves changed mostly in respect of extrapolation number or shoulder width, as LET was increased, the final slope remaining almost constant. The mode of variation in oxygen-enhancement ratio was strikingly similar to the pattern of variation in DQ as LET was increased. A straight line relationship was shown to exist between DQ value and oxygen-enhancement ratio when these values were computed for the same experiments at different values of LET alpha. (Jones-Wisconsin)
W74-00732

POLLUTION EFFECTS ON LITTORAL ALGAL COMMUNITIES IN THE INNER OSLOFJORD, WITH SPECIAL REFERENCE TO ASCOPHYLLUM NODOSUM,
Norway Inst. of Water Resources, Oslo.
J. Rueness.
Helgolander wissenschaftliche Meeresuntersuchungen, Vol 24, No 1-4, p 446-454, 1973. 3 fig, 8 ref.

Descriptors: *Water pollution effects, *Phaeophyta, *Algae, Succession, Littoral.
Identifiers: *Norway (Oslofjord), *Littoral algae, *Ascophyllum nodosum, Fucus.

Qualitative changes are obvious when present floristic data is compared with what is known from the earliest collections of algae from the inner Oslofjord, as many easily recognizable species have disappeared or become very rare. In 1897 Ascophyllum nodosum was common and abundant but 20 years later the species had been forced further outward. Two causal categories may be operating as a result of pollution: Polluted water exerts a direct unfavorable effect on growth and development of the alga; polluted water has no direct unfavorable effect on growth and development but in polluted localities indirect biotic factors lead to an unfavorable competitive situation for the species. Growth and development of Fucus distichus spp. edentatus from germlings to fertility and its regrowth and succession in three localities were followed. Growth and development of transplanted Ascophyllum nodosum were compared with native plants in the Drobak area. Well-grown specimens of Ascophyllum nodosum were transplanted to the inner basin and no essential differences in vegetative growth and maturation of generative structures were observed. Increased competition for substrate and the shading effect of Enteromorpha reduces the potential A. nodosum germlings from becoming established. (Jones-Wisconsin)
W74-00733

ON ADVECTION IN PHYTOPLANKTON MODELS,
Florida State Univ., Tallahassee. Dept. of Meteorology.
J. O'Brien, and J. S. Wroblewski.
Journal of Theoretical Biology, Vol 38, No 1, p 197-202, 1973. 8 ref.

Descriptors: *Spatial distribution, *Advection, *Phytoplankton, *Mathematical models, Marine biology, *Food chains, Productivity, Diffusion, Turbulence, Model studies, Biomass, Dynamics, Velocity, Kinetics.
Identifiers: Non-dimensional ratio, Sargassa Sea, Gulf Stream, *Florida continental shelf.

The question explored is: When does advection need to be included in a marine food chain model. The thesis is offered that the non-dimensional ratio, S, is a measure of the importance of advection in determining the spatial structure of plankton distributions in marine food chain models. Scale analysis has been used to deduce this new non-dimensional number, S, whose magnitude indicates the importance of including advection in a marine ecosystem model. When S is greater than 1, advection greatly affects biological productivity; when S is less than 1, advection may be neglected. When S is order 1, advection and biological productivity play competing roles in determining the spatial configuration of the plankton biomass. Some real oceanographic situations where the a priori importance of advection in a spatial marine food chain model is uncertain are considered: for the Sargassa Sea, the parameter values obtained from* the resulting value of S indicates horizontal advection may be neglected when modeling phytoplankton. In the rapidly moving system of the Gulf Stream, the horizontal advection is a dominant factor. This technique is presently being utilized in a lower trophic level model of the West Florida continental shelf. (Jones-Wisconsin) *Munk and Carver (Tellus 2:158,1950)and Thomas and Dodson (Biol Bull mar biol lab. Woods Hole 134:199,1968).
W74-00737

LAKE WASHINGTON,
W. T. Edmondson.
In: Environmental Quality and Water Development, W. H. Freeman, and Co. San Francisco, 1973. C. R. Goldman, editor, p 281-298, 1 fig.

Descriptors: *Eutrophication, *Recreation, Sewage, *Sewage treatment, *Political aspects, Pollution, *Washington, Water quality, Lakes, Diversion, Phytoplankton, Detergents, Planning, Land use, History, Environmental effects.
Identifiers: Puget Sound, Citizen action, Seattle (Wash), *Lake Washington (Wash), Oscillatoria rubesceus.

Development of Seattle and nearby communities led to the use of Lake Washington for sewage disposal in ever increasing quantities from early in the 1900's until the 1960's in spite of diversion of Seattle's sewage to Puget Sound in 1936. Between 1941 and 1954 ten secondary biological sewage treatment plants were established on the lake. However pollution problems multiplied as urban growth continued. Levels of phytoplankton abundance increased drastically in the 1950's. A relatively dense growth of the blue-green alga Oscillatoria rubescens heralded a further deterioration of the lake. Diversion of additional sewage to Puget Sound between 1963 and 1968 resulted in considerable decreases in phosphate concentrations, nitrate and carbon dioxide levels in winter. Summer abundance of phytoplankton also dropped sharply with corresponding increases in water transparency. Detrimental impact on Puget Sound appears minimal. Primary treatment is given to Seattle's outflow which is deposited 3,600 feet offshore at a depth of 240 feet. Diversion of sewage followed increasing public concern and action and state legislation permitting communities to joint together and form a municipality to finance and carry out certain functions. A Seattle area municipality was established by a 1958 vote. The Lake Washington experience can be used as an example of how volunteer citizen action can lead to major accomplishments in protecting the environment. Ways in which this experience may be applied in other places are discussed. A brief review of the controversy about the use of phosphorus-containing detergents is included. (Edwards-North Carolina)
W74-00739

RECONNAISSANCE ANALYSIS OF EFFECTS OF WASTE-WATER DISCHARGE ON THE SHALLOW GROUND-WATER FLOW SYSTEM, LOWER LAS VEGAS VALLEY, NEVADA,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 05B.
W74-00748

PROJECT REPORT FOR VENTURA COUNTY PLANNING DEPARTMENT AND CASITAS MUNICIPAL WATER DISTRICT ON WATERSHED DEVELOPMENT IMPACT ON LAKE CASITAS.
Montgomery Research, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 05B.
W74-00752

CHEMICAL AND BIOLOGICAL PATTERNS IN THE LOWER COLORADO RIVER SYSTEM,
Arizona Univ., Tucson.
L. G. Everett, J. S. Carlson, and H. K. Qashu.
Journal of the Arizona Academy of Science, Vol 8, No 2, p 91-94, June 1973, 2 fig, 3 tab, 2 ref.

Descriptors: *Eutrophication, *Nutrients, *Algae, *Salinity, *Colorado River basin, Artificial lakes, Lake stages, Sewage, Sediments, Plankton, River systems.

Domestic, industrial, and agricultural activity in the upper Colorado River basin states causes a rise in salinity of nearly 240 ppm above Hoover Dam due to salt loading. About 10.4 million tons of salt per year pass the dam itself. Increasing develop-

ment and water use in the upper and lower basins should cause a progressive increase in water salinity in the river hydrologic system. Spatial and temporal variabilities in system properties are real and are considered of primary importance in the study presented. These changes are caused by the nature of changes in water, sediment, solute, sewage effluent, and recreational product inputs. Degradation of the phytoplankton and zooplankton were observed and changes in species dominance was illustrated across Lake Mead and in other parts of the Lower Colorado River System. Causes of these changes are speculative and may be associated with changes in concentration of essential nutrient species. Limited amounts of some essential micronutrients were documented in areas showing undesirable changes in plankton species. The increase in many ions may cause the absence of changes in biota or serve to enhance the limiting effects of low concentrations of micronutrients. (Muller-Arizona)
W74-00760

PRELIMINARY SURVEY OF MERCURY AND OTHER METALS CONTAINED IN ANIMALS FROM THE FRASER RIVER MUDFLATS,
British Columbia Univ., Vancouver. Inst. of Oceanography.
T. R. Parsons, C. A. Bawden, and W. A. Heath.
Journal of the Fisheries Research Board of Canada, Vol 30, No 7, p 1014-1016, July 1973. 1 tab, 2 ref.

Descriptors: *Water pollution effects, Pacific Coast Region, *Mercury, Aquatic animals, *Benthic fauna, *Municipal wastes, *Sewage, Heavy metals, Aquatic life, Metals, Cations, Coasts, *Canada, Clams, Oysters, Crabs, Pollutant identification, Pollutants, Water pollution, Bays.
Identifiers: Vancouver (British Columbia), *Fraser River (British Columbia), Cowichan River (British Columbia), Kitimat River (British Columbia).

Crabs, oysters, clams, and other benthic animals from Sturgeon Bank (north of the Fraser River main arm) were found to contain larger amounts of mercury and other metals (notably Ag, Cd, and Cu) than did similar specimens from similar British Columbia coastal environments (Roberts Bank, south of the Fraser, Cowichan Bay mudflats, and Kitimat Arm). These higher metal levels are believed to be associated with the municipal sewer outfall from Vancouver. (Brown-IPC)
W74-00764

ORGANOCHLORINE RESIDUES IN HARP SEALS (PAGOPHILUS GROENLANDICUS) CAUGHT IN EASTERN CANADIAN WATERS,
Ontario Ministry of Agriculture and Food, Guelph. Pesticide Residue Lab.
R. Frank, K. Ronald, and H. E. Braun.
Journal of the Fisheries Research Board of Canada, Vol 30, No 8, p 1053-1063, August 1973. 8 tab, 13 ref.

Descriptors: *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, *DDT, *Dieldrin, *Marine animals, Aquatic animals, Water pollution effects, Seawater, Pollutant identification, Animal metabolism, Metabolism, Persistence, Pesticides, Age, Aging (Biological), *Canada.
Identifiers: *Seals (Animals).

Numerous seals from newborn to age 18 years were obtained from the Gulf of St. Lawrence and the Newfoundland and Labrador coasts, and analyzed for DDT and its metabolites. Total DDT levels in blubbers exceeded 2 ppm in Gulf bedlamers and wild beaters, compared to less than 2 ppm for corresponding coast animals. DDT levels increased to 8.7 ppm as the animals matured, but leveled off in femals at 6.5 ppm as they reached breeding age. Dieldrin levels were only 5% of those for total DDT and did not accumulate appreciably in either wild or captive seals. PCB residues were only slightly less than total DDT and showed a similar increase with animal age. Residues in tissues of captive seals were as much as eight times higher than in nature, indicating either that natural diets contain lower residues than the selected diet of captive seals, or that chlorinated organics are assimilated at different rates in wild vs. captive animals. Brain lipids contained only 7-20% of all three chlorinated hydrocarbons found in the extractible fat of blubber, muscle, and liver, indicating a brain barrier. (Brown-IPC)
W74-00766

SOME COMPARISONS IN THE THERMAL STRUCTURE OF LAKES WOOD, KALAMALKA, OKANAGAN, SKAHA, AND OSOYOOS, BRITISH COLUMBIA,
Departmet of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 02H.
W74-00769

SALTWATER POND RESEARCH,
Texas Parks and Wildlife Dept., Austin.
For primary bibliographic entry see Field 08I.
W74-00815

BIOLOGICAL INVESTIGATIONS OF LAKE WINGRA,
Wisconsin Univ., Madison. Lab. of Limnology.
J. F. Koonce, M. Teraguchi, P. C. Baumann, and A. D. Hasler.
Copy available from GPO Sup Doc as EP1.23:73-044, $1.45 microfiche, from NTIS as PB-224 930/8, $1.45. Environmental Protection Agency Ecological Research Series Report EPA-R3-73-044, August 1973. 118 p, 51 fig, 6 tab, 77 ref. EPA Project 16010 EHR.

Descriptors: Aquatic life, Aquatic algae, Crustacens, Fish, Aquatic environment, *Biological communities, Theoretical analysis, *Nutrient requirements, *Succession, Lakes, *Wisconsin, Model studies, *Optimization, Phytoplankton, Benthos, Zooplankton, Energy budget.
Identifiers: *Lake Wingra (Wis).

An investigation of seasonal changes in species diversity and biomass of phytoplankton, zooplankton, benthos, and fish in Lake Wingra, Madison, Wisconsin, was conducted during 1970 and 1971. The objective was to obtain ecological data on the biological components of an aquatic ecosystem and to utilize these data along with concurrent chemical data to aid the development of systems models of nutrient and energy fluxes in lake drainage basins. Interpretations of the data reveal several important considerations for models of lake system and future studies of Lake Wingra. Phytoplankton associations, for example, appear to be adaptive, self-organizing systems. Such behavior suggests the possibility to apply optimization principles to phytoplankton models. The data suggest, furthermore, that optimization analysis can be based on size particle distributions of the phytoplankton, which, rather than species, appears to be the basis of phytoplankton categories. Zooplankton and benthos analyses, on the other hand, indicate that energy and nutrient fluxes may be adequately approximated by simulating only a few species. Finally, results of fish studies imply that models of whole lake ecosystems must account for the mobility of predators in estimating their impact on prey populations, which should be characterized by differing spatial and temporal susceptibility to predation. (EPA)
W74-00833

EFFECTS OF THERMAL EFFLUENTS ON BIOCENOSES OF WATER BODIES (O KHARAKTERE VLIYANIYA TERMAL'NYKH SBROSNYKH VOD NA BIOTSENOZY VODOYEMOV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
N. S. Zolotareva, A. P. Musatov, and M. V. Sanin.
Vodnyye Resursy, No 1, p 65-75, 1973. 3 tab, 52 ref.

Descriptors: *Thermal pollution, *Heated water, *Pollutants, *Water pollution effects, *Bodies of water, Temperature, Water temperature, Water cooling, Aquatic life.
Identifiers: USSR, *Biocenoses, Hydrobionts.

Heated effluents can have beneficial as well as undesirable effects on hydrobiont activity. Moderate heating within limits of the temperature optimum for organisms stimulates growth of hydrobionts in the absence of pollution and retards their growth in polluted waste water. Heating above the temperature optimum inhibits biological processes and impoverishes ecosystems by reducing the number of species. Further heating of water results in hydrobiont decline. In winter the effects of moderate heating are more beneficial than in summer. An increase in water temperature of 1 to 3 deg C has no significant effect on hydrobiont activity. Observations and experimental studies by Soviet and foreign authors on effects of water temperature on marine organisms are reviewed. (Josefson-USGS)
W74-00842

SOUTHERN CALIFORNIA'S DETERIORATING MARINE ENVIRONMENT, AN EVALUATION OF THE HEALTH OF THE BENTHIC MARINE BIOTA OF VENTURA, LOS ANGELES AND ORANGE COUNTIES,
Center for California Public Affairs, Claremont.
R. C. Fay.
1973. 76 P, 7 FIG, 3 PLATE, 8 TAB, 98 REF, 1 APPEND.

Descriptors: *California, *Marine biology, *Biota, *Aquatic habitats, Oceans, Marine fish, Aquatic life, Marine plants, Kelps, Biological communities, Biomes, Ecology, Environmental effects, Water resources, Water management (Applied), Marine algae.
Identifiers: *Southern California.

This description of the health of the local marine biota was prepared in a framework of consideration of the natural components of the marine environment of southern California and from the viewpoint of the effects of man's actions upon the total biota of the inshore area. This report is offered to encourage the development of an understanding of the biological importance of the various marine habitats of southern California, the major biological groupings now found in these habitats, the relationship of these organisms to one another and to their environment, and the extraordinarily high potential for biological productivity of the local ocean versus that of the land. Attention is called to the large number of species of marine organisms found in the local ocean as an indication of the complexity of the problems in resource management. Several projects are proposed for modification of the shoreline. The proposed projects will have biological effects and some may modify areas of the shoreline which are still in a primitive condition. (Reed-Florida)
W74-00877

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME II.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00891

BACTERIA, YEASTS, VIRUSES AND RELATED MICROORGANISMS OF THE CHESAPEAKE BAY,
Georgetown Univ., Washington, D.C. Dept. of Biology.
For primary bibliographic entry see Field 02L.
W74-00893

FUNGI OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
For primary bibliographic entry see Field 02L.
W74-00894

NANNOPLANKTON OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany; and Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00895

PHYTOPLANKTON OF THE CHESAPEAKE BAY,
Academy of Natural Sciences of Philadelphia, Benedict, Md. Benedict Estuarine Lab.
For primary bibliographic entry see Field 02L.
W74-00896

BENTHIC MACROALGAE OF THE MARYLAND PORTION OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
For primary bibliographic entry see Field 02L.
W74-00897

MACROALGAE OF THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 02L.
W74-00898

BRYOPHYTES AND LICHENS OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
For primary bibliographic entry see Field 02L.
W74-00899

VIRUSES OF AQUATIC PLANTS OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
For primary bibliographic entry see Field 02L.
W74-00900

SUBMERGED VASCULAR PLANTS OF THE CHESAPEAKE BAY AND TRIBUTARIES,
American Univ., Washington, D.C. Dept. of Biology.
For primary bibliographic entry see Field 02L.
W74-00901

EMERGENT VASCULAR PLANTS OF CHESAPEAKE BAY WETLANDS,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 02L.
W74-00902

VASCULAR PLANTS OF THE CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Botany.
For primary bibliographic entry see Field 02L.
W74-00903

FREE-LIVING PROTOZOA OF THE CHESAPEAKE BAY EXCLUSIVE OF FORAMINIFERA AND THE FLAGELLATES,
Maryland Univ., College Park. Dept. of Zoology.
For primary bibliographic entry see Field 02L.
W74-00904

FORAMINIFERA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Dept. of Paleobiology.
For primary bibliographic entry see Field 02L.
W74-00905

CTENOPHORES OF THE CHESAPEAKE BAY,
Richmond Univ., Va.
For primary bibliographic entry see Field 02L.
W74-00906

CNIDARIA OF THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 02L.
W74-00907

PRIAPULIDA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Office of Environmental Sciences.
For primary bibliographic entry see Field 02L.
W74-00908

TARDIGRADA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Office of Environmental Sciences.
For primary bibliographic entry see Field 02L.
W74-00909

KINORHYNCHA OF THE CHESAPEAKE BAY,
Smithsonian Institution, Washington, D.C. Office of Environmental Sciences.
For primary bibliographic entry see Field 02L.
W74-00910

DIGENETIC TREMATODES OF THE CHESAPEAKE BAY,
Gulf Coast Research Lab., Ocean Springs, Miss.
For primary bibliographic entry see Field 02L.
W74-00911

MOLLUSCS OF THE CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00912

POLYCHAETES OF THE CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00913

FREE-LIVING COPEPODA OF THE CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00914

DECAPOD CRUSTACEANS OF THE CHESAPEAKE BAY,
National Marine Fisheries Service, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-00915

FISHES OF THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Goucester Point.
For primary bibliographic entry see Field 02L.
W74-00916

AMPHIBIANS OF THE CHESAPEAKE BAY REGION,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00917

REPTILES OF THE CHESAPEAKE BAY REGION,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00918

CURRENT STATUS OF THE KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS IN CHESAPEAKE BAY,
Maryland Univ., Prince Frederick. Hallowing Point Field Station.
For primary bibliographic entry see Field 02L.
W74-00920

CURRENT STATUS OF KNOWLEDGE CONCERNING THE CAUSE AND BIOLOGICAL EFFECTS OF EUTROPHICATION IN CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-00921

CURRENT STATUS OF KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF HEAVY METALS IN THE CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Medicine.
For primary bibliographic entry see Field 02L.
W74-00922

BIOLOGICAL MODELS OF FRESHWATER COMMUNITIES,
Washington Univ., Seattle. Coll. of Fisheries.
F. B. Taub.
Copy available from GPO Sup Doc as EP-1.23:660-73-008, $1.05; microfiche from NTIS as PB-225 029/8, $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-008, August 1973. 73 p, 31 fig, 15 tab, 7 ref. EPA Project 16050 DXM.

Descriptors: *Model studies, *Algae, *Protozoa, *Chlamydomonas, Ciliates, Bacteria, Nitrates, Light intensity, Primary productivity, Secondary productivity, Cultures, Pesticide toxicity, *DDT, *Polychlorinated biphenyls, Water pollution effects.
Identifiers: Chemostats, *Tetrahymena vorax.

Data from continuous cultures of an alga (Chlamydomonas reinhardtii) and protozoan (Tetrahymena vorax) have been used to construct a model of algal standing crop over ranges of light intensity, dilution rate, and nutrient concentration both in the absence and presence of predation by the protozoa. The model predicts that predation can reduce algal standing crop only within certain ranges of the environmental variables. The comparative toxicities of Aroclor 1242, a polychlorinated biphenyl, and DDT, were tested on the alga and protozoan, and also on daphnids, ostracods, and guppies. (EPA)
W74-00925

DYNAMIC WATER QUALITY FORECASTING AND MANAGEMENT,
Manhattan Coll., Bronx, N.Y. Dept. of Civil Engineering.
D. J. O'Connor, R. V. Thomann, and D. M. Di Toro.
Copy available from GPO Sup Doc as EP-1.23:660-73-009; $2.05; microfiche from NTIS as PB-225 048/8, $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-009, August 1973. 20 p, 51 fig, 14 tab, 91 ref. EPA Project R800369.

Descriptors: *Water quality, *Mathematical Models, *Computer Models, Water pollution, *Cycling nutrients, Eutrophication, Dispersion,

Mass Transfer, Nutrients, Oxygen demand, Photosynthesis, Simulation analysis, Estuaries, Dissolved oxygen, Nitrogen, Phosphorus, Carbon.
Identifiers: Delaware River estuary, Potomac River estuary.

The formulation and initial verification of two modeling frameworks are described. The first is directed toward an analysis of the impact of the carbonaceous and nitrogenous components and wastwater on the dissolved oxygen resources of a natural water system. The second modeling framework concentrates on the interactions between the discharge of nutrient, both nitrogen and phosphorus, and the biomass of the phytoplankton and zooplankton populations which result, as well as incorporating the overall impact on dissolved oxygen. The models are formulated in terms of coupled differential equations which incorporate both the effect of transport due to tidal motion and turbulence, and the kinetics which describe the biological and chemical transformations that can occur. The modeling frameworks are applied to the Delaware and Potomac esturaries in order to estimate the ability of such models to describe the water quality effects of carbon, nitrogen, and phosphorous discharges. The agreement achieved between observation and calculation indicate that the major features of the impact of wastewater components on eutrophication phenomena can be successfully analyzed within the context of the models presented. (EPA)
W74-00927

TOXICITY AND ACCUMULATION OF LEAD IN THE COMMON MUSSEL MYTILUS EDULIS IN LABORATORY EXPERIMENT, (IN GERMAN),
Institut fuer Meeresforschung, Bremerhaven (West Germany).
M. Schulz-Baldes.
Mar Biol (Berl). Vol 16, No 3, p 226-229. 1972. Illus. (English summary).
Identifiers: Laboratory tests, *Lead, Lethal limit, Mortality, *Mussel, Mytilus-Edulis, Time, *Toxicity.

In a laboratory experiment, conducted over 130 days, 3 batches of a total of 100 common mussels, M. edulis, were maintained in media containing different Pb concentrations. Two vessels served as controls. There was no acute injury to the mussels; but, over an extended period of time, a marked increase in mortality occurred which was related to the Pb concentration in the medium. The median lethal time (LT50) was computed to be 218 days for the control, 150 days with 0.5 mg Pb/l in the medium, 129 days with 1 mg/l, and 105 days with 5 mg/l. Quantitative analyses of the soft parts of M. edulis by flameless atomic-absorption-spectrophotometry revealed a distinct accumulation of Pb. From a natural Pb content of 8.4 microgram Pb/g dry weight, the Pb concentration increased to 12,840 microgram/g at 0.5 mg/l, to 20,770 microgram/g at 1 mg/l and to 39,830 microgram/g at 5 mg/l. The ratio of the concentration of Pb in the soft parts of M. edulis to the concentration in the medium remained in the same order of magnitude both under laboratory conditions using high Pb concentrations and under in situ Pb levels. Over a period of 130 days, Pb uptake expressed as percentage of Pb offered was 10.9% at 0.5 mg/l, 9.5% at 1 mg/l, and 3.4% at 5 mg/l, respectively.--Copyright 1973, Biological Abstracts, Inc.
W74-00972

COPPER CONTENT OF OYSTERS (CRASSOSTREA ANGULATA) ALONG THE HUELVA COASTS, (IN SPANISH),
Instituto de Investigaciones Pesqueras, Cadiz (Spain).
R. Establier.
Invest Pesq. Vol 36, No 2, p 293-296. 1972. Illus. (English summary).
Identifiers: Coasts, *Copper, Crassostrea-Angulata, *Oysters, *Spain (Huelva Coast), *Toxicity.

Oysters (C. angulata) collected in the area around Huelva (Spain) contain very high (toxic) amounts of Cu (average 144.9 mg/100 g fresh body weight).--Copyright 1973, Biological Abstracts, Inc.
W74-00978

HEALTH ASPECTS OF FISH PRODUCTS FROM POLLUTED WATER,
C. Sebastio.
Vet Ital. Vol 23, No 1/2, p 120-128. 1972.

Descriptors: Disposal, Fish, *Food chains, *Italy, *Marine pollution, Poluted coasts, Sewage, Toxicity, Public health, Water pollution effects.

In Italy, 74% of the coastal cities discard their sewage into the sea; only 13.6% of the 8000 km of shoreline is free of pollution. The accumulation of pollutants in the marine food chain is discussed. Strict controls (chemical, toxicological, epidemiological) on fish used for human consumption are suggested.--Copyright 1973, Biological Abstracts, Inc.
W74-00979

SIGNIFICANCE OF DOCKS IN DISSEMINATION OF DIPHYLLOBOTHRIASIS NEAR RIVERS AND LARGE TRANSPORT WATER BODIES (ACCORDING TO DATA FROM THE VOLGA PIERS AND THE VOLGOGRAD RESERVOIR), (IN RUSSIAN),
Institute of Medical Parasitology and Tropical Medicine, Moscow (USSR).
E. P. Razumov, and I. Ya. Mikhailenko.
Med. Parazitol Parazit Bolezn, Vol 41, No 1, p 90-94, 1972, English summary.
Identifiers: *Diphyllobothriasis, Dephyllobothrium-latum, Dissemination, Docks, Fecal, Health, *Human diseases, Occupational categories, Piers, Reservoirs, Rivers, *USSR (Volgograd).

In 1966-1968 in Volgograd and Kyybishev regions of USSR, the population was examined and data from the local sanitary-epidemiological conditions were analyzed. The rate of diphyllobothriasis infestation was established: in fishermen, 10-45%; in dock workers 1.5-1.2%; and in members of crews, 0.6%. Specimens of water (451) and of bottom soil were analyzed in the laboratory. Eggs of Diphyllobothrium latum were found in 180 specimens. Docks were important sources of fecal contamination of the coastal shallow waters of the Middle and Lower Volga. Fishermen, dock workers and crews of the navigating boats must be examined for heminthic diseases and undergo clinical follow-up treatment.--Copyright 1973, Biological Abstracts, Inc.
W74-00991

DYNAMICS OF CHANGES IN CORTICAL ACTIVITY IN ALBINO RATS WITH CHRONIC SILVER INTOXICATION (IN UKRAINIAN),
L. A. Kul's'kyi, P. D. Kharchenko, and P. Z. Stepanenko.
Dopov Akad Nauk Ukr Rsr Ser B Heol Heofiz Khim Biol, Vol 34, No 7, p 660-662, 1972, English summary.
Identifiers: Albino rats, Brain, *Cortical activity, Inhibition, Liver, *Rats, Reflex, *Silver, *Potable water.

The effect of ionic Ag of various concentrations in drinking water (0.5, 2, 20 mg/l) on the conditioned reflex activity of albino rats was studied. An Ag dose of 0.5 mg/l does not affect the conditioned reflexes; an Ag dose of 2 mg/l evokes a disturbance in the conditioned reflex activity after 4-mo. intoxication. An Ag dose of 20 mg/l causes inhibition of excitation at the end of the second mo. of intoxication; as the intoxication time increases, an intensification in the excitation process, differentiation disinhibition and increase in intersignal response quantity are seen. After 5-6 mo. intoxication, the inhibition of positive conditioned reflexes with a progressing growth in inhibition intensity again arises. After 9-mo. intoxication with doses of 20 mg/l, Ag accumulated in brain (24%) and liver (80%) tissues compared with animals which drank the usual town water.--Copyright 1973, Biological Abstracts, Inc.
W74-00997

THE EFFECT OF NUTRIENTS ON THE GROWTH OF BACTERIAL POPULATION IN WATER,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
W. A. Godlewska-Lipowa.
Bull Acad Pol Sci Ser Sci Biol, Vol 20, No 7, p 473-475, 1972, Illus.
Identifiers: *Bacterial growth, *Nutrients, Trophic types, Water pollution effects, Lakes, *Bactopeptone.

Increase in the number of bacterial cells, obtained after few-hours exposure of isolated water samples, void of zoo- and phytoplankton, was directly proportional to the trophic type of the water-culture medium. The most stimulating effect was produced by bactopeptone, then KNO3 and KH2PO4, and the least (NH4)2SO4. The lower the trophism degree of the lake the more effective was the addition of these substances for bacterial populations.--Copyright 1973, Biological Abstracts, Inc.
W74-01001

TROPHIC STRUCTURE AND BIOACTIVITY OF THE PLANKTON COMMUNITIES IN LOWER REACH OF ELBE ESTUARY; CRITERIA FOR SAPROBIC CLASSIFICATION OF A TIDAL WATER (IN GERMAN),
I. Noethlich.
Arch Hydrobiol Supplement B, Vol 43, No 1, p 33-117, 1972, Illus, English summary.
Identifiers: Estuaries, Algae, Diatoms, Actinocyclus-normannii, Bacteria, Coscinodiscus-lacustris, *Germany Elbe estuary, *Plankton communities, *Saprobic classification, Tidal water, *Trophic structure.

Analysis of the trophic structure of the limnetic plankton community of the Elbe estuary, West Germany, was carried out in 1967. The inflow of organic detrital material favors omnivorous consumers, the biomass of which dominate (75% of total consumer biomass). On account of the specific estuarine conditions there will be a rapid destruction of organic material by bacteria leading to mineralization, with the consequence that inorganic P- and N-substances will not be lacking. Consequently, a specific bloom of autochthonous diatoms (Actinocyclus normannii, Coscinodiscus lacustris) may take place. These algae are apparently not utilized by herbivorous organisms. Measurements of bioactivity indicate an eudynamic and eutrophic situation. The estuary is classified as alpha-mesosaprobic.--Copyright 1973, Biological Abstracts, Inc.
W74-01003

FOUR METASAPROBIC COMMUNITIES OF COLORLESS FLAGELLATES,
For primary bibliographic entry see Field 05B.
W74-01006

ECOLOGICAL STUDY OF THE CYANOPHYTES AND CHLOROPHYTES IN SOME PONDS AROUND BRUGES: DETERMINATION OF THE DEGREE OF TROPHISM IN ACCORDANCE WITH SCHROEVER'S PI QUOTIENT, (IN GERMAN),
Ghent Rijksuniversiteit (Belgium).
D. Somers.
Biol Jaarb. 39 p: 238-260, 1971, Illus.

Identifiers: *Belgium (Bruges), Chlorophyta, *Chlorophtes, Cyanophyta, *Cyanophytes, Desmidiales, Ecological studies, Ponds, Protococcales, Schroever's PD quotient, *Trophism.

Samples were taken every 4 wk in 4 ponds around Bruges, Belgium, for a year. Some physical and chemical factors were determined. Of the phytoplankton, biotection and metaphyton, the Cyanophyta and Chlorophyta were examined qualitatively. The dominant organisms were studied semiquantitatively. The abioticum and the phyto-organisms were compared and an attempt to determine the trophism by Schroever's PD (Protococcales: Desmidiales) quotient was made--Copyright 1973, Biological Abstracts, Inc.
W74-01012

PRIMARY PRODUCTION-PHYTOPLANKTON RELATIONSHIP IN THE CRAPINA-JIJILA COMPLEX IN THE FLOOD CONDITIONS OF 1970, (IN RUMANIAN),
Bucharest Univ. (Rumania). Faculty of Biology.
For primary bibliographic entry see Field 02I.
W74-01015

SOME PHYTOPLANKTON CHARACTERISTICS IN COOLER BASINS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
E. I. Fedorova.
Gidrobiol Zh. Vol 8, No 2, p: 28-33. 1972. (English summary).
Identifiers: Dystrophic state, *Eutrophication, *Phytoplankton, *Heated water, *Cooling basins, Thermal pollution.

Introduction of hot water into lakes is known to cause increases in number and biomass of phytoplankton; heat-loving species, not representative of the surrounding region, often appear. An example is given of a lake, used for some time as a cooling basin, which was dystrophic in 1931, but is now highly eutrophic.--Copyright 1973, Biological Abstracts, Inc.
W74-01017

THE EFFECT OF ATRAZINE AND DIURON ON THE PRODUCTIVITY OF CLADOCERA. (EXPERIMENTAL STUDIES), (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobilogii.
E. P. Shcherban'.
Identifiers: *Atrazine, Ceriodaphnia-Quadrangula, *Cladocera, *Diuron, Moina-Macrocopa, Productivity, Scapholeberis-Mucronata, *Herbicide toxicity.

The effect of small concentrations of diuron (0.05-0.25 mg/1) and atrazine (1 mg/1) upon the productivity of Cladocera (Moina macroscopa (Straus), Ceriodaphnia quadrangula (Muller), and Scapholeberis mucronata (Muller)) was studied for a 1-15 mo. period. For S. mucronata and C. quadrangula reproduction increases in the first generation and drops rapidly thereafter. In M. macrocopa adaptation in 2-4 generations and an increase in reproduction was observed. The most susceptible to poisons was S. mucronata, which should make a good specimen in toxicological studies of herbicides.--Copyright 1973, Biologocal Abstracts, Inc.
W74-01024

CHARACTERISTICS OF THE TOXIC EFFECTS AND SAFETY LEVELS OF NITRILES OF CROTONIC AND ISOCROTONIC ACIDS IN WATER BODIES, (IN RUSSIAN),
Kharkovskii Meditsinskii Institut (USSR).
N. F. Loskutov, and N. N. Piten'ko.
Gig Sanit. Vol 37, No 4, p 10-14. 1972. Illus. (English summary).
Identifiers: *Crotonic acid, Guinea-Pigs, *Nitriles, Rats, *Toxicicity, *Isocrotonic acid, Mice, Lethal limit.

The effects of nitriles of crotonic and isocrotonic acids on the organoleptic properties of water, the sanitary regimen of water bodies and on rats, guinea pigs and mice were studied. Introduced orally under conditions of acute, subacute and chronic poisoning, the nitriles had a common general toxic action on the bodies of warm-blooded animals, with a dominating effect on the CNS. The maximum permissible concentration of both substances in water bodies is 0.1 mg/l.--Copyright 1973, Biological Abstracts, Inc.
W74-01044

BOTTOM FAUNA OF DEAD VISTULA,
Warsaw Univ. (Poland). Zoological Inst.
L. Klekot.
Pol Arch Hydrobiol. Vol 19, No 2, p 151-166, 1972. Illus.
Identifiers: *Bottom fauna, *Poland (Dead Vistula), *Salinity, *Oxygen, *Water temperature.

The environmental factors in Dead Vistula, Poland, salinity, O2 content, temperature of water and character of bottom were investigated. The qualitative species composition of macrobenthos was analyzed. Special attention was paid to the dependence of the occurrence of common organisms in Dead Vistula on salinity. Seasonal investigations on the dynamics of numbers and biomass distinguished the dominant groups in the overgrown parts and in the parts without plants in 3 regions in various seasons. Considerable differentiation of the bottom fauna and great seasonal changes were observed.--Copyright 1973, Biological Abstracts, Inc.
W74-01073

INTRODUCTION TO STUDY 'IN SITU' OF PLANKTON ECOLOGY IN LAKE GENEVA, (IN FRENCH),
For primary bibliographic entry see Field 02H.
W74-01079

PRIMINARY SYSTEM DEVELOPMENT, CHEMICAL HAZARDS RESPONSE INFORMATION SYSTEM (CHRIS),
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-01092

5D. Waste Treatment Processes

THE WATER BUDGET AND WASTE TREATMENT AT A MODERN DAIRY,
Mississippi State Univ., State College. Water Resources Research Inst.
J. B. Allen, J. F. Beatty, S. P. Crockett, and B. L. Arnold.
Available from the National Technical Information Service as PB-224 792, $3.00 in paper copy, $1.45 in microfiche. Completion Report, July 1973. 30 p, 15 fig, 3 tab, 7 ref. OWRR A-065-MISS (1).

Descriptors: Water demand, *Dairy industry, Lagoons, *Hydrologic budget, *Waste treatment, *Mississippi, *Waste water treatment, Industrial wastes, Biochemical oxygen demand.

This study was concerned with an analysis of the dairy water budget and an evaluation of the efficiency of a 2-cell lagoon waste treatment system for a modern 130-cow dairy at Holly Springs, Mississippi. The water budget at the dairy was determined by means of water meters installed on the main supply line, the alley flushing system, the milking parlor flush tanks, the prep stalls, the milk-room and the waterers. Data collection began on June 15, 1972, and continued through June 15, 1973. The water budget was summarized on a weekly basis by means of a computer print-out. For an average of 114 cows, the average water usage was 16,738 gallons per day (gpd). The amounts of water used in the various components of the dairy were: alley flushing systems, 5,372 gpd; milking parlor flush tanks, 6,869 gpd; prep stalls, 809 gpd; milk-room hot water, 320 gpd; cattle waterers, 2,113 gpd; and miscellaneous, 1,255 gpd. The BOD of the milking parlor wastes entering the first cell of the waste treatment system averaged 699 mg/l, and the BOD of the free stall alley wastes entering the first cell averaged 758 mg/l. The overall treatment efficiency of cell 1 (reduction in BOD) was 62.9%. The overall treatment efficiency of cell 1 plus cell 2 was 86.5%.
W74-00560

MECHANISM OF ORGANIC ADSORPTION ON ACTIVATED CARBON,
Maryland Univ., College Park. Dept. of Civil Engineering.
J. T. Cookson, Jr.
Available from the National Technical Information Service as PB-224 813, $5.25 in paper copy, $1.45 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No 17, April 1973. 59 p, 10 fig, 13 tab, 36 ref. OWRR A-014-MD (1). 14-31-0001-3020.

Descriptors: *Waste water treatment, *Activated carbon, *Chlorinated hydrocarbon pesticides, *Organic compounds, *Toxins, Water pollution sources, Water supply, *Adsorption, Tertiary treatment, Water purification, Methodology, Evaluation.
Identifiers: *Synthetic organic pollution.

Some knowledge is provided on the physicochemical nature of organic adsorption from aqueous solution on activated carbon. Carbon surface characteristics, as well as interactions with adsorbates were studied. Filtrasorb 200, a commerical activated carbon produced from coal by high temperature steam activation, was used as the adsorbent with various adsorbates. Surface characteristics of the commercial activated carbon were modified by outgassing at different temperatures, and by dry and solution oxidation. Equilibrium and kinetic studies are conducted in batch systems, under controlled conditions of pH, ionic strength and temperature. The adsorption of mercaptan is complex. Three simultaneous phenomena occur: adsorption of the mercaptan, its oxidation to disulfide catalysed by the activated carbon and adsorption of disulfide. Mechanisms for the catayitic activity of activated carbon involving the quinone groups and metal ions are proposed. The adsorption of mercaptan is studied in the absence of oxygen. Copper and iron on the surface of the carbon significantly influence the adsorption of butyl disulfide. The adsorption energy and the adsorption rate decrease when metals are eliminated, indicating ion-induced dipole interactions. Parahydroxybenzaldehyde exhibits highest affinity probably due to a strong interaction of the aromatic ring with the carbon's surface carbonyl groups. The rate of adsoprtion of butyl disulfide , carbon surface oxides cause a reduction of more than two logs on the rate of adsorption. Rate of adsorption of p-hydroxybenzaldehyde is only slightly affected by the presence of the acidic surface oxides. (Woodard-USGS)
W74-00565

SPRAY DISPOSAL OF SEWAGE EFFLUENT,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
E. A. Myers.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeo-

graphed Report, p 92-99, February 1973. 1 fig, 2 tab, 9 ref. 14-31-0001-3823.

Descriptors: *Water reuse, *Spraying, *Sprinkler irrigation, *Waste water disposal, Path of pollutants, Waste treatment, Sprays, Infiltration, Recharge.
Identifiers: *Spray irrigation.

Spray irrigation for final disposal of sewage effluent is safe and appropriate when the systems are adequately designed and conscientiously operated. Only certain pollutants can be removed appropriately by the absorptive, biological, chemical, and physical reactions with the mantle. Other pollutants can completely destroy this living filter, thus producing additional pollution rather than renovation. Reuse of renovated water usually is governed by need, economics, and local legal limitations. Potential outlets include industrial, domestic, and agricultural uses. Ultimately salt may be a problem with reuse of reclaimed sewage effluent unless it is properly blended with freshwater or desalinized, as each time it goes through a cycle of domestic use it picks up about 300 ppm of salt. (See also W73-09113) (Knapp-USGS)
W74-00572

WASTEWATER TREATMENT TECHNOLOGY (SECOND ADDITION),
Illinois Inst. of Tech., Chicago.
J. W. Patterson, and R. A. Minear.
Available from NTIS, Springfield, Va., 22151 as PB-216 162 Price $9.00 printed copy; $1.45 microfiche. Illinois Institute for Environmental Quality, Final Report IIEQ 73-1, February 1973. 363 p.

Descriptors: *Waste water treatment, *Industrial wastes, *Water pollution treatment, Methodology, Arsenic compounds, Boron, Cadmium, Fluorides, Iron, Lead, Manganese, Mercury, Nickel, Oil wastes, Hydrogen ion concentration, Phenols, Dissolved solids, Zinc, Water quality control, Water pollution control.
Identifiers: Barium, Cyanide, Selenium, Silver.

This revised edition is a state-of the-art survey of industrial waste treatment literature pertaining to 23 materials found in industrial wastes: arsenic, barium, boron, cadmium, chloride, chromium (hexavalent), chromium (trivalent), copper, cyanide, fluoride, iron (soluble), iron (total), lead, manganese, mercury, nickel, oily wastes, pH control, phenols, selenium, silver, total dissolved solids, and zinc. Information on existing methods of treatment, levels of treatment attainable, and associated costs is presented. (Woodard-USGS)
W74-00582

ON THE ISOLATION OF VIRUS FROM SEWAGE TREATMENT PLANT SLUDGES,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark).
For primary bibliographic entry see Field 05A.
W74-00628

LEAST-COST ALLOCATION AND VALUATION MODEL FOR WATER RESOURCES,
city Univ. of New York. Dept. of Mathematics.
H. P. Young, and R. G. Thompson.
Water Resources Research, Vol 9, No 5, p 1186-9985, October 1973. 2 fig, 13 ref.

Descriptors: *Economic efficiency, Water quality, Waste treatment, *Waste assimilative capacity, *Regions, Technology, Costs, Optimization, Marginal costs, Water allocation (Policy), Water values, Equations, Mathematical models, Systems analysis, Water demand.
Identifiers: *Environmental quality, *Quadratic programming, *Cost minimization, Nonlinear programming.

An optimization model is presented which considers both economic efficiency and environmental quality. The model allows for trade-offs between the technologies of water use and waste treatment and the capacities of different regions for waste assimilation in determining how much water will be used and how much waste, to discharge in each region. The objective is to determine the combination of production processes in each region that minimizes the over-all cost of meeting the demands for goods and for water quality, subject to resource availability by region. The input-output coefficients of water-using production processes are written as functions of intake water quality so that the feedback effects of waste discharge on the economic process itself may be evaluated. The incorporation of the feedback effects necessitates a nonlinar formulation of the problem; it is shown that a nonlinear formulation can be obtained to a good approximation by a linearly constrained quadratic program. This model could be used to evaluate water development projects on a consistent basis; in particular it would calculate the marginal values of water in different regions and the marginal costs of meeting different water quality objectives. Since it includes the economic trade-offs between different technologies and production regions, such a model provides an accurate determination of the value of water in different uses. (Bell-Cornell)
W74-00670

THE EFFECTS OF WATER TEMPERATURE AND ELEVATION UPON AERATION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. S. Hunter, and J. C. Ward.
Available from the National Technical Information Service as PB-224 814, $4.75 in paper copy; $1.45 in microfiche. Presented at the Symposium on Wastewater Treatment in Cold Climates, University of Saskatchewan Saskatoon, Saskatchewan, Canada, August 22, 1973. 46 p, 8 fig, 2 tab, 24 ref. OWRR A007 COLO (3), 14-31-0001-3506.

Descriptors: *Aeration, *Water temperature, Altitude, *Oxygen, *Dissolved oxygen, *Air temperature, *Elevation, Waste water treatment.
Identifiers: *Oxygen transfer, Low water temperature, High elevation, Oxygen aeration, Mechanical aeration, Atmospheric pressure.

A laboratory-scale mechanical aeration system was used to examine the variation in oxygen transfer rates into water as a function of water temperature (0 to 40C). The over-all volumetric mass transfer coefficient, liquid phase base, increased linearly with water temperature at a rate of 2.84% per C. The relative aeration efficiency decreases with increasing elevation, water temperature, and dissolved oxygen concentration. For zero dissolved oxygen and elevation, the rate of oxygen transfer per unit volume and time is independent of water temperature for 0 to 50C. Equations were developed relating saturation dissolved oxygen concentration to temperature and atmospheric pressure to elevation and air temperature. An equation was developed for predicting average annual air temperature (for locations in the U.S.) from elevation, longitude, and latitude: T ± 96.3 - 1.352N + 0.142W - 1.59 E where T ± air temperature, F; N ± degrees north latitude; W ± degrees west longitude, and E ± elevation in thousands of feet.
W74-00699

SUMMARY REPORT: PILOT PLANT STUDIES ON DEWATERING PRIMARY DIGESTED SLUDGE,
Los Angeles County Sanitation District, Calif.
J. D. Parkhurst, R. F. Rodrigue, R. P. Miele, and S. T. Hayashi.
Copy available from GPO Sup Doc as EP1.23:670 73-043, $2.10; microfiche from NTIS as PB-224 798, $1.45. Environmental Protection Agency, Technology Series report EPA-670/2-73-043, August 1973. 202 p, 40 fig, 57 tab, 51 ref. EPA Program Element 1B2043, Contract R801658.

Descriptors: Pollution abatement, *Sludge treatment, *Dewatering, *Sludge disposal, Heat treatment, Polymers, Flyash, Filters, Incineration, Landfills, Pipelines, Land reclamation, *Pilot plans, *California, Estimated costs, Centrifugation.
Identifiers: *Los Angeles, Sludge processing, Pilot study, Performance data, *Primary digested sludge.

A 14-month pilot and plant scale sludge dewatering study was conducted at the Joint Water Pollution Control Plant (JWPCP) -- a 380 mgd primary treatment facility owned and operated by the Los Angeles County Sanitation Districts. Ocean discharge requirements on the effluent from this facility necessitated that at least 95 percent of the suspended solids be removed from the primary digested sludge for disposal by alternative means. The applicability of heat, polymers, chemicals and flyash was investigated as a means of conditioning digested sludge for dewatering. Sludge dewatering schemes utilizing horizontal scroll centrifuges, imperforate basket centrifuges, vacuum filters and pressure filter were thoroughly studied. Operational results were obtained from twenty conditioning-dewatering test systems of which five successfully produced the desired suspended solids removal. Full scale cost estimates were prepared for each of the five systems. Estimates were prepared for the requirements and costs associated with the ultimate disposal of dewatered sludges generated from each successful dewatering scheme. Three disposal alternatives were considered, namely, truck hauling of dewatered sludge from the JWPCP to a landfill; pipeline transport of digested sludge to a landfill with dewatering and disposal there at; and incineration at the JWPCP with truck hauling of the ash residue to a landfill. Combining the disposal costs with the dewatering costs yielded estimates for fifteen total sludge handling systems. Remote area transportation and disposal costs were derived for comparative purposes. It was concluded that a 2-stage centrifuge sludge dewatering scheme (polymer addition to the second stage) with truck hauling of dewatered sludge solids to a landfill was most suitable for the JWPCP. (EPA)
W74-00700

ALGAE OF SECONDARY SETTLING TANKS, (IN RUSSIAN),
Kharkov State Univ. (USSR). Dept. of Lower Plants.
T. V. Dohadina, and N. A. Chukhlibova.
Ukr Bot Zh. Vol 28, No 6, p 749-752. 1971. (English summary).
Identifiers: *Algae, Chlorophyceae, Cyanophyceae, Diatoms, Diversity, Euglenophyta, *Settling tanks, *USSR (Kharkov), Yellow-Green algae, Treatment facilities.

Results are presented of studying species composition, seasonal dynamics and quantity of algae in secondary settling tanks of 2 canalization stations of biological sewage treatment in Kharkov: Glavnaya and Bezlyudovskaya (USSR). In all 80 spp. and intraspecific taxa of 5 algae were found, among them 4 of Euglenophyta, 36 of Chlorophycae, 5 of yellow-green algae, 30 diatoms, 5 of Cyanophyceae. Most frequent algae species are presented. It was established that in the secondary settling tanks periphyton is more developed than phytoplankton with respect to both quantity and species diversity. Plankton and periphyton of the secondary settling tanks are formed due to wash out of algae of a biological film from biofilters.--Copyright 1973, Biological Abstracts, Inc.
W74-00730

REPORT TO THE GOVERNOR AND THE LEGISLATIVE COMMISSION: POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY.
Las Vegas Valley Water District, Nev.

December, 1972. 18 p, 1 fig, 1 tab, 3 append.

Descriptors: *Planning, *Water supply, *Water pollution, *Environmental effects, Treatment, Desalination, Water reuse, Evaporation, *Nevada.
Identifiers: Lake Mead, *Las Vegas Valley District (Nev), Las Vegas Wash.

In 1971, the Southern Nevada Water System to import Lake Mead water to Las Vegas Valley and Boulder City became operational under the management of Las Vegas Valley Water District (LVVWD). Lake Mead, now the source of about one-half of the Valley's potable water supply, could become the source of 85% within a few decades. This report is sixth in a series on the development of a plan to eliminate pollution of Lake Mead in the vicinity of Las Vegas Wash. The conceptual plan calls for a water reclamation program including demonstration wastewater treatment and desalt plants, the encouragement of in-valley uses of treated wastewater, the development of Las Vegas Wash as a recreational area and wildlife habitat, and the export of remaining waters to Dry Lake for evaporation. The abatement program is on schedule but legislative and gubernatorial approval of means to finance the project together with continued cooperation of government agencies and citizen groups is necessary to meet the proposed schedule. The Project Report and Design Index, which combined make up the definitive work on the project, plus the Environmental Assessment are summarized. Three related subjects are treated in the appendices: (1) chemical, physical and biological conditions of waters of Las Vegas Bay of Lake Mead; (2) ecology of Las Vegas Wash under alternative actions in water quality management, and (3) hydraulic characteristics of shallow groundwater flow system in lower part of the Valley. (Hoffman-North Carolina)
W74-00744

SEWER SYSTEM COST ESTIMATION MODEL.
Voorhees (Alan M.) and Associates, Inc., McLean, Va.

Prepared for Regional Planning Council, Baltimore, Md. April, 1969. 132 p, 5 fig, 11 tab, 13 ref.

Descriptors: *Planning, *Sewerage, *Computer models, *Cost analysis, *Maryland, Dynamic programming, Land use, Design criteria, Equations, Projections, *Regional analysis.
Identifiers: Land use plans, *Baltimore (Md).

A computerized model to estimate the cost of alternative wastewater collection systems is described. The model can be used as a planning tool in that it can project the cost of constructing and maintaining a given sewer system for a given land use pattern. The inputs to the model include a land use pattern or projection which is converted into expected wastewater flows, a digital description of the topography of the area, and a diagramatic plan of the proposed sewer system. The model uses dynamic programming and various engineering constraints and cost-estimating equations in an attempt to find the least cost solution. The outputs from the model include the size of each pipe in the sewer system, the location of pumps, and the cost of the system both in terms of present worth and operation and maintenance. The use of the model for regional planning is quite significant as it can quickly determine the impact of existing or future land use patterns on existing or proposed sewer systems, or conversely, can determine sewer system requirements for alternative land use plans. (Elfers-North Carolina)
W74-00745

SOLID WASTE MANAGEMENT PLAN, COWLITZ AND WAHKIAKUM REGION.
Cowlitz, Wahkiakum Regional Planning Commission, Kelso, Wash.

1973. 92 P, 24 FIG, 29 TAB, 4 APPEND.

Descriptors: *Solid wastes, *Landfills, *Washington, *Columbia River, Leaching, Waste disposal, Ravines, Marshes, Dikes, Urbanization.
Identifiers: Kelso-Longview Urban Area (Wash), *Cowlitz and Wahkiakum Region (Wash), Sanitary landfill, Tightlines, Hilltops, Riversides.

Needs are identified for disposing of solid wastes in a two-county region in the Columbia River Valley, including the Kelso-Longview Urban area, where manufacturing of aluminum, paper, lumber and wood products and agriculture are the basic industries. Alternative proposals for solid waste storage, collection, transportation, and disposal, are developed and evaluated. Criteria for determining acceptibility of alternatives were: (1) pollution of streams and rivers, (2) legal restrictions on garbage burning, (3) facilitation of vector and disease control, (4) location, maintenance, and operation so as to protect public health, prevent air and water pollution, and avoid creation of public nuisances, and (5) prevention of land pollution and economic resource conservation. Planning procedure included collection of data regarding current waste management practices, land resources, and potential waste generation. Recommendations for immediate action relevant to present practices are made. Eventual creation of one central sanitary landfill is favored; environmental hazards and economic costs of hilltop, ravine, riverside, and marsh landfill sites are evaluated. Potential for surface water contamination is considered. Consequently, tightlines are proposed for ravine sites and dikes, ditches, sumps, and retention ponds for riverside sites. A six-year capital improvements program and long-term administrative measures are recommended. Model ordinances for counties and towns regarding solid waste disposal are appended. (Stein-North Carolina)
W74-00747

LAMAR COUNTY: LAND USE SURVEY AND ANALYSIS, LAND USE PLAN, HOUSING, WATER AND SEWER, OPEN SPACE.
West Alabama Planning and Development Council, Tuscaloosa.

June, 1973. 272 p, 35 fig, 30 tab.

Descriptors: *Water supply, *Sewerage, *Waste water treatment, *Alabama, Planning, Water demand, Environmental effects, Financing, Costs, Coordination, Water quality, Urban land use, Rural areas.
Identifiers: *Utility extension, Lamar County (Ala.).

Objectives of the Lamar County Water and Sewer Plan are: to provide adequate water and sewer service to all county residents, to maximize the use of existing water resources, and to promote a coordinated approach to developing plans and designing a good area wide water and sewer system. Interests of the public and individual customers of water systems can best be served by self-sustained, utility-type enterprises whose gross revenue should cover operating and maintenance expenses, fixed charges on capital treatment, and system development. Proposed system changes must be approved by state health and water improvement agencies. Financing the expansion of a water system in areas of rapid growth is a problem. Incorporated areas, Beaverton, Detroit, Kennedy, Millport, Sulligent, and Vernon, have water supply systems. Only the last two have sanitary sewer systems. There is no county water system or sanitary sewer system serving rural areas. Storm drainage is a system of open ditches and culverts related to the railroad and highway system. Water from subsurface aquifers contains excessive iron. Proposed water service areas for the county, an inventory of the various existing water and sewer systems accompanied by appropriate maps and data, and a short range development program for each for the period 1972-1982 are presented, and the possibility of connecting some of the systems to achieve a joint water supply system is discussed. No area wide sewer system is feasible, based on present cost estimates and existing development pattern. (Edwards-North Carolina)
W74-00750

REGIONAL WATER SUPPLY/SEWAGE DISPOSAL PLAN AND SHORT-RANGE PROGRAM, 1973-1978.
Central New York Regional Planning and Development Board, Syracuse.

Report No. CNYRPDB-RP-72-HUD-246-03. November, 1972. 21 p, 2 fig, 2 tab. 424-1;424.2, NYP-246.

Descriptors: *Planning, *Water supply, *Sewerage, *Regional development, *New York, Land use, Urbanization, Administration, Project planning, Priorities.
Identifiers: *Urban guidance systems, Central New York Region.

The Regional Planning Board's primary objective in planning for regional water and sewerage systems is the promotion of orderly urban development in accordance with the Regional Land Use Plan. The Board views the major elements of water and sewerage systems, such as treatment plants and trunk lines, to have a region-shaping quality much more significant than traditional land use controls, e.g. zoning. Thus, the plans are closely related to land use plans and focus on existing, short-term, and long-term service areas. Unified area-wide water and sewerage systems are not presently possible because of the fragmentation of existing systems and administrative arrangements, but the Board is taking the lead to move in that direction via various coordination, information, and planning programs. The Board expects that the counties will play a key role in the implementation of regional systems. The Board presents a program of specific projects for the period 1973-1978. Projects are ranked in terms of importance on the basis of five criteria: effect on public health and sanitation, effect on water quality, conformance with regional comprehensive plans, relation to the provision of housing, and citizen approval and involvement. (Elfers-North Carolina)
W74-00753

WASTE WATER CLARIFICATION AND SOLIDS RECOVERY WITH 'WASTE WATER BENTONITE': REPORT ON A STUDY TRIP TO SWEDEN (ABWASSERKLAERUNG UND STOFFRUECKGEWINNUNG MIT 'ABWASSER-BENTONIT': BERICHT UEBER EINE REISE NACH SCHWEDEN),
Technische Universtaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
H.-L. Dalpke.
Wochenblatt fuer Papierfabrikation, Vol 100, No 11/12, p 400-402, June 15, 1972. 1 tab, 2 fig, 2 ref.

Descriptors: *Pulp wastes, *Flocculation, *Waste water treatment, Treatment facilities, Water pollution treatment, *Bentonite, Clays, Water purification, Industrial wastes, Liquid wastes, Pulp and paper industry, Europe, Coagulation, Flotation, Sedimentation, Polymers, Polyelectrolytes, Adsorption, Ion exchange, Biochemical oxygen demand, Suspended solids, Effluents, Costs, Capital costs, Operating costs, Temperature, Hydrogen ion concentration, Foreign research.
Identifiers: *Flygtol process, *Retamix process, Germany, *Sweden, Polyacrylamide, Westerviks Pappersbruks AB. (Sweden), Board mills, Waste paper.

The Swedish 'Flygtol' process, a variant of the 'Retamix' process, is based on a patented Hungarian invention by Prof. Libor and makes use of a specially activated, complex-forming, and highly swellable bentonite having a surface area of 100-120 sq m/g, which is marketed by Erbsloeh und Co., Geisenheimer Kaolinwerke, Geisenheim/Rhein, West Germany. Its flocculating power derives from both Van der Waals adsorption forces and ion-exchange capacity, while its high specific gravity (2.6 g/cu cm) aids the rapid formation of microflocs which can be further coagulated by polyacrylamide or a similar polyelectrolyte, and separated by sedimentation or, in special cases, by flotation. The process is said to be insensitive to temperature variations between zero and 30C and to pH variations between 1 and 14. The process operates on an industrial scale at Westerviks Papperabruk AB., Sweden, which manufactures boxboard and linerboard from recycled waste papers. Waste waters containing 700-1700 mg/liter of insoluble solids are treated with 60 g/cu m of activated bentonite to achieve a solids reduction to an average of 2 mg/liter. The resulting sludge is reused as filler, and 20-75% of the clarified water is reused in the mill. The bentonite treatment also reduces the effluent BOD from 190-270 to 60-75 mg oxygen per liter. Capital plus operating costs of the installation total 6 German pfennigs per cu m. (Speckhard-IPC)
W74-00762

REDUCING EVAPORATION PLANT POLLUTION PLANT POLLUTION AND ITS TREATMENT,
Rosenlew (Oy. W.) A.B., Pori (Finland).
A. A. R. Ronnholm.
Paperi ja Puu (Papper och Tra), Vol 54, No 11, p 715-730, Nov. 1972. 12 fig, 3 tab, 13 ref.

Descriptors: *Pulp wastes, *Water pollution sources, *Evaporation, *Water pollution treatment, *Biochemical oxygen demand, *Economic feasibility, Incineration, Pulp and paper industry, Industrial wastes, Waste water (Pollution), Costs, Cost-benefit analysis, Byproducts, Capital costs, Operating costs, Fuels, Steam, Water pollution, Europe, Effluents, *Waste water treatment.
Identifiers: Furfural, Methanol (Or Methyl alcohol), Acetic acid, Kraft mills, Flue gas, Finland, Chemical recovery.

Prospects are discussed for low-pollution evaporators and evaporation processes for spent pulping liquors, including the purity and utilization of evaporator condensates, the treatment of noncondensable stack gases, and the removal or recovery of BOD-consuming condensate components, notable furfural, acetic acid, and methanol. It is concluded that currently available equipment and technology can achieve 100% return of condensates while lowering BOD constituents by 75%. At this maximum BOD reduction, the treatment of stack gases and concentrated partial condensates would require a capital investment of ca. 2400 Finnish marks plus operating costs (mainly for pump power and stripper steam) of ca. 0.25 mark per ton of evaporated water. By burning the removal methanol, which has about half the heating value of oil, operating costs can be lowered to 0.20 mark per ton. As example, a draft mill manufacturing daily 1500 tons of pulp and discharging dilute black liquor containing 0.6 g of methanol per cu m into a river-lake system 100 m wide, 2 m deep, and containing 5 g oxygen per cu m, could prevent the depletion of 2 g/cu m oxygen by recovering 75% of the methanol produced (240 kg/hr) which would otherwise consume 180 kg/hr of oxygen and require a water flow past the mill of about 4000 km/year. (Brown/IPC)
W74-00763

ECONOMIC FEASIBILITY OF AN INTEGRATED COTTONWOOD PLANTATION UTILIZING A NUCLEAR POWER REACTOR,
Battelle-Pacific Northwest Labs., Teheran (Iran).
For primary bibliographic entry see Field 03C.
W74-00771

BANKS STUDY BASIN CLEANUP.

Environmental Science and Technology, Vol 7, No 8, p 802-803, September 1973. 2 tab, 1 fig.

Descriptors: *Financial feasibility, *Future planning, *Pollution abatement, *Costs, *River basins, *Economic feasibility, *Connecticut River, New England, Interstate Rivers, Financing, Mathematical models, Model studies, Capital costs, Operating costs, Forecasting, Economic prediction, Project planning, Water pollution control, Solid wastes, Air pollution.

The Connecticut River Basin Project, a consortium of banks in New Hampshire, Massachusetts, and Connecticut serving the fourteen-county Basin area, estimated that government plus industry will have to spend about $1.3 billion to clean up the air, water, and solid waste pollution in the Basin. The one-year study, supported partly by EPA, cost about $150,000, and was based on available geographic, demographic, and economic information plus a forecasting model developed by Chase Econometric Associates, Inc. Capital and operating cost data for existing plants and new industrial growth needed to abate air and water pollution are tabulated separately. Various alternatives for financing these expenditures are examined. (Brown-IPC)
W74-00772

KRAFT PULPERS AND POLLUTION PROBLEMS AND PRESCRIPTIONS,
R. L. Miller.
Chemical Engineering, Vol 79, No 28, p 52, 54, 56, Dec 11, 1972. 1 fig, 2 ref.

Descriptors: *Water pollution, *Pulp wastes, *Bleaching wastes, *Waste water treatment, *Water pollution sources, *Water pollution treatment, Water reuse, Pulp and paper industry, Air pollution, Sedimentation, Aerated basins, Activated sludge, Treatment facilities, Industrial wastes, Liquid wastes, Effluents, Biological treatment, Suspended solids.
Identifiers: Kraft mills.

Water and air pollution in the kraft pulping industry are discussed. Per ton of pulp manufactured, a kraft mill uses 15,000 to 35,000 gal of water for unbleached and 15,000 to 60,000 additional gal for bleached pulp. If discharged without pretreatment, these waters could contain 20-30 lb of solids per ton of unbleached plus 6-35 lb per ton of bleached pulp. Sedimentation, aerated basins, and activated sludge are the main external effluent treatment methods, but particulars of water-reuse systems vary from mill to mill. (Witt-IPC)
W74-00774

THE ABC WAY TO BETTER WASTEWATER TREATMENT,
Environmental Quality Engineering, Inc., Oakland, Calif.
J. F. Kerl.
American Dyestuff Reporter, Vol 62, No 8, p 24-25, August 1973. 1 fig, 1 illus, 2 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Municipal wastes, *Textiles, *Treatment facilities, Activated sludge, Aeration, Recycling, Suspended solids, Biochemical oxygen demand, Phosphates, Phosphorus, Flocculation, Sedimentation, Aerated basins, Sludge, Separation techniques, Sewage treatment.
Identifiers: *ABC (Accelerated Biological-Chemical)process, Clarifiers.

The ABC (Accelerated Biological-Chemical) process developed by the University of California Sanitary Engineering Research Laboratory involves brief (30-60 min) detection aeration in the presence of activated sludge, followed by rapid sedimentation and recycle of all but a small portion of the sludges from the sedimentation steps to the aeration unit. The process is not only cheaper and faster but also superior to conventional activated sludge treatments under shock loading and transient conditions. It consistently removes over 90% of BOD, suspended solids, and phosphorus from mixed municipal-industrial wastes at volume loadings of 400-500 lb/day/1000 cu ft of aeration basin capacity. The first-stage reactor (30-60 min retention time) comprises two or more aerated compartments with provision for return solids reaeration. The first-stage separator is designed to maintain the desired mixed liquor volatile suspended solids. The second process stage consists of a flocculator and a final clarifier, and the second-stage separator is a normal circular or rectangular clarifier. The ABC process is being demonstration-tested at American Enka Co.'s textile fiber plant, Enka, N.C. (Brown-IPC)
W74-00776

A NEW ERA FOR COOLING WATER TREATMENT,
Betz Labs., Inc., Trevose, Pa.
E. W. James.
The Betz Indicator, Vol 42, No 4, p 3-5, 8-10, July/August 1973. 5 fig. (Adapted from Plant Engineering, Nov 16, 1972).

Descriptors: *Cooling water, *Water treatment, *Industrial water, *Corrosion control, *Water pollution sources, *Chromium, *Toxicity, Zinc, Phosphates, Polymers, Calcium carbonate, Sludge, Dispersion, Nitrogen compounds, Phosphorus compounds, Surfactants, Lignins, Hydrogen ion concentration, Temperature, Waste water treatment, Aquatic life, Metallurgy, Steel, Chlorine, Oxidation, Fouling.
Identifiers: Corrosion inhibitors, Lignosulfonates, Tannins, Phosphonates, Polyphosphates, Sulfuric acid, Dispersants, Chromium compounds, Chromates.

In the selection of cooling water treatments for control of corrosion, scale, inorganic and microbiological deposits, and fouling, environmental quality standards must be considered along with water temperature, pH, chemical composition, and metallurgical factors. Effluents from chromate-treated waters may require special treatment of the blowdown by chemical reduction, followed by lime precipitation of chromic sulfate. Chromate doses in closed systems (200-300 ppm) can be reduced to 20-50 for open recirculating systems at pH 6.0-6.8 by addition of polyphosphate and zinc. An ultralow chromate treatment (5-10 ppm) has become feasible in conjunction with polymeric phosphonate dispersants which retain calcium carbonate in solution and eliminate the need for sulfuric acid. Nonchromate corrosion inhibitors are becoming more popular because of their lower toxicity to aquatic organisms. One such inhibitor is based on an organic nitrogen compound in mixture with polyphosphate and zinc for use at pH 6.5-7.0. Another formulation uses a phosphonate scale control agent together with a zinc-free polyphosphate for protecting steel at pH 7.5-8.5. Lignosulfonates and modified tannins have also been upgraded by addition of phosphonate/polymer dispersants, but suffer from ready oxidation (e.g., by chlorine) with formation of sludge-forming degradation products. (Brown-IPC)
W74-00777

POWER PLANT COOLING SYSTEM STILL USING SEWAGE EFFLUENT.
Zia Co., Los Alamos, N. Mex.

The Betz Indicator, Vol 42, No 4, p 6-7, July/August 1973. (Reprinted from Zia News, Vol 24, No 9, Dec 14, 1972).

Descriptors: *Cooling water, *Industrial water, *Corrosion control, *Waste water treatment, *Powerplants, *Water treatment, *Chromium, *Water pollution sources, *Water conservation, Toxicity, Effluents, Freshwater, Water consumption (except consumptive use), Legislation, Regulation, Water law, Pollution abatement.
Identifiers: Corrosion inhibitors, Chromates.

To conserve freshwater, about 121,000,000 gal/year of sewage effluent has been used to supply over 75% of the cooling water at the AEC Los Alamos nuclear power plant. Recent water quality regulations prohibiting the discharge of all but a minimum amount of chromium prompted the construction of facilities for removal of chromate corrosion inhibitor from the blowdown discharge. When chromium emissions were still too high to meet environmental standards, a chromium-free inhibitor formulation was substituted, which proved to be not only less toxic but also more economical and permitted higher solids concentrations in the cooling system, resulting in less effluent blowdown and still lower freshwater consumption. (Brown-IPC)
W74-00778

INFLUENCE OF EVAPORATION CONDENSATE ON BIOLOGICAL PURIFICATION OF PULP WASH WATERS (EINFLUSS VON EINDAMPFKONDENSAT AUF DIE BIOLOGISCHE REINIGUNG VON ZELLSTOFFWASCHWASSERN),
Technische Universitaet, Dresden (East Germany).
H-J. Walther, and D. Knaack.
Zellstoff und Papier, Vol 21, No 6, p 168-173, June 1972. 3 fig, 2 tab, 4 ref.

Descriptors: *Activated sludge, *Pulp wastes, *Biological treatment, *Waste water treatment, *Sulfite liquors, Biodegradation, Pulp and paper industry, Suspended solids, Effluents, Industrial wastes, Liquid wastes, Laboratory equipment, Foreign research, Europe.
Identifiers: Multistage processes, Wash water, Pulp washing, East Germany.

Laboratory studies indicated that the presence of diluted condensate from the evaporation of spent sulfite pulping liquor does not significantly reduce the biodegradation of solids suspended in pulp wash water during a two-stage activated sludge treatment. A high biological purification is achieved even when the composition of the activated sludge undergoes substantial changes as a result of variations in the effluent. (Speckhard-IPC)
W74-00781

ENZYME-ENHANCED TURBIDITY REMOVAL THROUGH PRIMARY TREATMENT,
Weyerhaeuser Co., Miquon, Pa.
P. A. Schwonke, and W. S. Davis.
Tappi, Vol 56, No 1, p 93-95, Jan 1973. 1 tab, 6 ref.

Descriptors: *Pulp wastes, *Water pollution treatment, *Enzymes, *Waste water treatment, *Flocculation, *Suspended solids, Filtration, Pressure, Pulp and paper industry, Pennsylvania, United States, Dispersion, Surfactants, Color, Water reuse, Turbidity, Treatment facilities, Biodegradation, Industrial wastes, Effluents.
Identifiers: Starch, Amylase, Dispersants, Waste paper, Recycling, Clarifiers, White water, Cationic compounds, Pulpers, Hydrapulpers.

At the nonintegrated fine-paper mill of Weyerhaeuser Co. in Miquon, Pa., complete flocculation of suspended solids in the white water during primary clarifier treatment was hindered by a cationic starch present in the effluent, which originated from repulping of surface-sized dry broke. The starch was found to lose its dispersing power as the length of its macromolecular chain was reduced by amylolysis. Hence amylase was added to the hydrapulper and then to the sewer pump ahead of the clarifier. This enzyme treatment improved the removal of suspended solids, including color bodies, with attendant reduction of effluent turbidity. In conjunction with pressure filtration, it enabled the white water to be recycled as papermaking process water. It may also permit future clarifier installations to be of smaller dimensions. (Brown-IPC)
W74-00783

RECYCLING FINE-PAPER MILL EFFLUENT BY MEANS OF PRESSURE FILTRATION,
Weyerhaeuser Co., Miquon, Pa.
W. S. Davis, R. S. Kraiman, J. M. Parker, and C. H. Thorborg.
Tappi, Vol 56, No 1, p 89-92, Jan 1973. 3 fig, 1 tab, 1 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Filtration, *Water reuse, *Treatment facilities, Pulp and paper industry, Pennsylvania, United States, Biochemical oxygen demand, Enzymes, Chlorination, Chlorine, Slime, Surfactants, Filters, Pressure, Water treatment.
Identifiers: Starch, Dispersants, Cationic compounds, White water, Paper mills, Amylase.

Sand and gravel pressure filtration improved the quality of primary clarifier effluent to the extent that the filtrate could be reused as process water in the manufacture of printing and other fine papers. The BOD reduction thus achieved was about 16%. The filter installation has a designed throughput rate of 9 gal/sq ft/min, equivalent to about 1 million gal/day, compared to a total water consumption of 3 million gal/day by the paper mill. The filtered water is further improved by adding an amylase enzyme (6 ppm) to destroy the dispersant power of cationic starch present in the white water, and by treatment with chlorine (6 ppm) to prevent slime deposits. (Brown-IPC)
W74-00784

CLARIFICATION OF NSC WASTE LIQUOR BY ACTIVE CARBON, ETC., (IN JAPANESE),
Hokkaido Univ., Sapporo (Japan). Dept. of Chemistry of Forest Products.
M. Hanzawa, S. Satonaka, K. Miura, S. Yasuda, and S. Ishida.
Research Bulletins of the College Experiment Forests Hokkaido University, Vol 29, No 2, p 361-371 + 4 plates, 1972. 6 tab, 8 photomicrographs, 19 ref. (English summary).

Descriptors: *Pulp wastes, *Waste water treatment, *Activated carbon, *Sulfite liquors, *Ion exchange, Color, Pores, Porosity, Drying, Adsorption, Bark, Wood wastes, Foreign research, Coagulation, Oxidation, Industrial wastes, Oak trees, Hardwood.
Identifiers: NSSC pulping, Spent sulfite liquor, Spent pulping liquors, Decoloring, Ion exchangers, Charcoal, Japan.

The spent cooking liquor from the pulping of Japanese oak wood (Quercus mongolica var. grosseserrata) by the neutral sulfite semichemical (NSSC) process was treated with activated carbons which had been prepared from the bark of the same wood by reacting it with 70% sulfuric acid at 150, 170, or 190 C for 0.5, 1, 2, 4, or 8 hr to give carbon yields of 46.7 to 60.4%. Colorimetric absorbances at 400 and 273 nm wavelengths indicated excellent adsorption properties for the carbon obtained at 190 C in 0.5 hr. Among three different drying methods used, solvent dehydration with ethanol gave the best carbon; next best was freeze-drying; oven drying at 105 C was the least satisfactory. The relative ion-exchange capacity of the best C preparation was 0.235 meq/g for calcium chloride and 0.116 meq/g for sodium chloride. The hydrated preparations contained 62.2-63.8% C and 3.6-4.0% H. They showed a porous granular structure in the scanning electron microscope, with pore diameters of about 0.1 micron, suggesting that the pores are filled with water under moist conditions. When the spent NSSC liquor was treated in three stages with coagulants (CaO, aluminum sulfate or chloride, or ferric sulfate), with oxidants (potassium permanganate or hydrogen peroxide), and with adsorbents (hydrated activated C), its residual color approached that of freshwater, although it retained small amounts of noncolored matter. (Brown-IPC)
W74-00785

UNIQUE WATER TREATMENT PLANT ENSURES PURITY OF LAKE BAIKAL,
N. Chistyakov.
Pulp and Paper International, Vol 14, No 7, p 29-30, July 1972. 1 illus. Trans. from Nauka i Zhizn, No 1, 1972.

Descriptors: *Pulp wastes, *Water pollution treatment, *Treatment facilities, *Waste water treatment, *Lakes, Waste water (Pollution), Pulp and paper industry, Byproducts, Discharge (Water), Industrial wastes, Filtration, Aeration, Oxygenation, Aerated lagoons, Biological treatment, Sedimentation, Coagulation, Color, Biochemical oxygen demand, Effluents, Water pollution, Water pollution sources, Activated sludge, Sludge disposal, Sludge treatment, Foreign countries.
Identifiers: *Lake Baikal (USSR), Dissolving pulps.

The Baikal pulp mill produces dissolving-grade pulp for viscose rayon tire cord. Using 435-600 cu m fresh water per ton of pulp, the mill may take 200 cu m per min from Lake Baikal on reaching its 600 ton-per-day capacity. About 93-95% of dissolved organic substances are recovered and made into by-products, such as fodder yeast protein. The remaining effluent is pre-aerated, neutralized, filtered, sedimented, subjected to activated sludge treatment and decoloration by coagulation with aluminum sulfate, sulfuric acid, and polyacrylamide, and oxygenated in a 24-hr total treatment cycle. The purified effluent contains not more than 3-6 mg BOD per liter. It is discharged into the lake 160 m from the shore at a depth of 40 m with intensive (30:1) dilution via a dispersing mixer. Although part of the spent activated sludge is coagulated with ferric chloride and lime and marketed as a dry powder, over 15,000 tons of sludge have accumulated in four years of operation, augmented by 50-60 tons/year, for which a commercial outlet is being sought. (Witt-IPC)
W74-00786

BLEACHING EFFLUENT FOR IRRIGATION,
Stephen F. Austin State Coll., Nacogdoches, Tex.
J. C. Norris, K. G. Watterson, and H. V. Wiant, Jr.
Pulp and Paper, Vol 46, No 9, p 90, Aug 1972. 2 tab, 7 ref.

Descriptors: *Bleaching wastes, *Soil disposal fields, *Irrigable land, *Irrigation effects, *Forest soils, *Microorganisms, *Waste water disposal, Waste disposal, Ultimate disposal, Industrial wastes, Liquid wastes, Irrigated land, Pulp and paper industry, Pulp wastes, Texas, United States, Irrigation, Chlorination.

Effluents from pulp bleaching plants, notably those discharged from the chlorination and alkaline extraction stages, were shown to have no detrimental effects on the activity of microorganisms in three Texan forest soils (a Eustis sand, a Mantachie fine sandy clay loam, and a Blake clay). These findings offer encouragement that bleaching wastes may, after some long-term research, be disposed of routinely as irrigation water on forested lands. (Witt-IPC)
W74-00787

CENTRIFUGE DEWATERS SLUDGE AT RATE OF 10 TONS PER DAY,
American Can Co., Ashland, Wis.
V. Schmidt.
Pulp and Paper, Vol 46, No 8, p 56-57, July 1972. 4 illus.

Descriptors: *Pulp wastes, Treatment facilities, *Sludge treatment, Water pollution treatment, *Centrifugation, *Waste water treatment, Solid wastes, *Waste disposal, *Landfills, Sludge disposal, Dewatering, Industrial wastes, Water pollution sources, Recycling, Wisconsin, Pulp and paper industry, Effluents, Suspended solids, Ultimate disposal.
Identifiers: Centrifuges, Paperboards, Waste paper, Napkins, Paper napkins, Boxboard, Repulping.

Waste paperboard from American Can Co.'s boxboard and carton factory is repulped and separated into fibers and contaminants. The reclaimed fibers are recycled into paper napkins. Clay, printing ink, plastic coatings, titanium dioxide pigment, and other contaminants are removed from the effluent in a clarifier. The clarifier sludge is dewatered in a model P5400 Sharples Super-D-Canter centrifuge and disposed of as landfill. (Witt-IPC)
W74-00788

SWITCHING FROM CALCIUM BISULFITE TO TWO-STAGE SODIUM-CALCIUM BISULFITE PULPING TO REDUCE WATER POLLUTION (ZNIZENIE ZNECISTENIA ODPADNYCH VOD PRECHODOM Z CA-BISULFITOVEHO VARENIA NA DVOJSTUPNOVE NA-CA-BISULFITOVE),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
L. Balhar, R. Borisek, H. Majlingova, and J. Strenger.
Papir a Celuloza, Vol 27, No 6, p 121-123, 1972. 2 fig, 2 tab, 6 ref.

Descriptors: *Digestion, *Pulp wastes, *Sulfite liquors, *Water pollution, *Waste water treatment, Biochemical oxygen demand, Sodium compounds, Calcium compounds, Pulp and paper industry, Industrial wastes, Softwood, Conifers.
Identifiers: Pulp yield, Pulpwood, Spruce trees, Sulfite mills, Spent sulfite liquors, Raw material conservation, Multistage processes.

Experimental laboratory digestions of spruce wood were conducted in order to compare the relative water pollution loads of spent cooking liquors discharged in the conventional calcium-base sulfite process compared to a two-stage sulfite cook using sodium plus calcium bisulfites. At pulp yields of 55 and 60%, the five-day BOD of the two-stage spent liquor was found to be 20 and 30% lower, respectively, than that of the discharge from the single-stage calcium-base digestion to 50% pulp yield. Since the mixed-base process allows the wood to be cooked to higher yields without impairment of pulp quality, thus conserving more fibrous new material, it is highly recommended to sulfite pulp and paper mills having no spent liquor combustion facilities. (Trubacek-IPC)
W74-00789

FINNISH DIRECTIONS IN SOLVING WATER POLLUTION PROBLEMS,
Central Association of Finnish Woodworking Industries, Helsinki.
E. Malmi.
Paper Trade Journal, Vol 156, No 49, p 36-37, Nov 27, 1972. 1 tab.

Descriptors: *Pulp wastes, Water pollution control, *Pollution abatement, *Economic feasibility, Water pollution treatment, *Waste water treatment, *Investment, Capital cost, Costs, Pulp and paper industry, Europe, Foreign countries, Sulfite liquors, Biochemical oxygen demand, Suspended solids, Liquid wastes, Industrial wastes, Legislation, Regulation, Water law, Permits, Treatment facilities, Planning, Long-term planning, Future planning.
Identifiers: *Finland, Chemical recovery, Spent sulfite liquor, Spent pulping liquors, Sulfite mills, Kraft mills, Paper mills, Board mills.

Between 1960 and 1969, the production of sulfite pulp, kraft pulp, paper, and board in Finland has increased by 10, 130, 98, and 128%, respectively. Although the attendant discharge of BOD loads into water courses increased only 10%, it amounted to 407,000 tons in 1969, despite legal requirements imposing a discharge permit since the 1962 Finnish Water Act. The pollution-control program planned for the 1970's expects the industry to invest about $160,000,000 for effluent treatment facilities; two-thirds of this will go for mechanical treatment plants designed to halve the present annual discharge of 300,000 tons of suspended solids; the remainder will be used to increase the recovery of spent sulfite liquors from 76 to 85% or better in the country's fifteen sulfite mills. Only after internal control measures have been applied will the industry focus its attention on external treatment of effluents, spending an estimated $50,000,000 for reducing dissolved organic matter through chemical and/or biological processes. While some sulfite mills may be able to switch from calcium to a soluble-base cooking liquor and to pollution-free oxygen bleaching, other older or smaller mills may have to shut down. (Witt-IPC)
W74-00790

OXYGEN-CONSUMING ORGANIC MATTER (BOD) IN EFFLUENTS ORIGINATING IN DIFFERENT PULPING PROCESSES OF THE WOODWORKING INDUSTRY: REVIEW OF LITERATURE DURING THE YEARS 1960-1970,
Finnish Pulp and Paper Research Inst., Helsinki.
For primary bibliographic entry see Field 05B.
W74-00793

WATER REUSE IN INDUSTRY, PART I -- POWER GENERATION,
Sargent and Lundy, Chicago, Ill.
A. F. Aschoff.
Mechanical Engineering, Vol 95, No 4, p 21-25, April 1973. 9 fig.

Descriptors: *Water reuse, *Industrial water, *Powerplants, Cooling water, *Waste water treatment, Water pollution control, *Thermal pollution, Effluents, Water resources, Reverse osmosis, Ion exchange, Electrodialysis, Nuclear reactors, Waste water (Pollution), Nuclear wastes, Industrial wastes, Liquid wastes, Waste water treatment, Recycling.

By the year 2000, the U.S.A. will need over 1 trillion gal of water daily. With common sense and careful management, availability can be assured through steady attempts to close the loop by recycling or reuse in another function. The power industry, one of the largest industrial users of water, needs water mainly for condensation of exhaust steam from turbine generators, but also as a sluicing agent for disposal of bottom ach and flyash generated in coal-fired power boilers, for disposal of radioactive and other wastes from nuclear reactors, and as high-purity makeup water in the heat cycle of all types of power plants. Various modern technologies for treatment and reuse of polluted or thermally polluted waste waters in the power industry are discussed and illustrated, such as discharges from cooling lakes, wet and dry cooling towers, spray ponds, floating spray assemblies, ash basins, and boiling-water or pressurized-water reactors. Ion-exchange resins, electrodialysis, and reverse osmosis are examples of promising future water-treatment techniques. (See also W74-00795 thru W74-00798) (Brown-IPC)
W74-00794

WATER REUSE IN INDUSTRY, PART 2 -- TRANSPORT WATER,
Pavia-Byrne Engineering Corp., New Orleans, La.
E. H. Pavia, and A. D. Tyagi.
Mechanical Engineering, Vol 95, No 5, p 32-34, May 1973. 4 fig.

Descriptors: *Industrial water, *Water reuse, *Waste water treatment, Fish handling facilities, Transportation, *Food processing industry, Water pollution sources, *Hydrogen sulfide, Toxicity, Water pollution control, Recycling, Sulfides, Emulsions, Oil, Oil-water interfaces, Sedimentation, Industrial wastes, Pilot plants, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: Fish oil, Fish meal, *Transport water, *Fish-processing industry, Materials handling, Degasification, Dissolved gases.

In 1970 the U.S. produced 264,800 tons of fish meal and 96,850 tons of fish oil. The water used as transport medium in fish-reduction plants is highly contaminated and may exceed a five-day BOD of 40,000 and a COD of 400,000 mg/liter. Dissolved hydrogen sulfide poses a particular toxicity hazard. A water-recycling and pollution-control system developed at Zapata Protein Inc. is described. It was put into operation in August 1972 after pilot-scale testing. The installation is based on a degasification process which destroys the water-oil-dissolved gas emulsion, thus making the de-equilibrated components amenable to conventional separation by sedimentation. With steadily improved operation, the system permitted over 95% of water to be reused and its sulfide content to be held below 3 mg/liter. Further improvements are anticipated for the 1973 fishing season. (See also W74-00794) (Brown-IPC)
W74-00795

WATER REUSE IN INDUSTRY, PART 3 -- MINE WATER,
Environmental Protection Agency, Washington, D.C.
J. M. Shackelford.
Mechanical Engineering, Vol 95, No 6, p 32-34, June 1973.

Descriptors: *Mine water, *Acid mine water, *Water reuse, *Industrial water, *Waste water treatment, Government supports, Water pollution sources, Federal government, Neutralization, Dissolved solids, Sludge disposal, Iron compounds, Oxidation, Biological treatment, Electrochemistry, Reverse osmosis, Electrodialysis, Ozone, Freezing, Freeze drying, Foam fractionation, Distillation, Ion exchange, Lime, Limestones, Research and development.
Identifiers: *Neutralosis, Federal research.

Billions of gallons of polluted water are involuntarily released by the mining and mineral-extraction industries. The conversion and recycling of this drainage water have been the objects of a four-year-old EPA research program which has already yielded promising results, particularly for solving acid mine and drainage problems caused by ferrous and ferric sulfates and sulfuric acid from the oxidation of pyritic ores. The old technique of lime neutralization does not effectively remove total dissolved sulfur, generates a large amount of sludge, and requires large land impoundment areas. Limestone in lieu of lime has several advantages, but cannot precipitate ferrous hydroxide. Biological and electrochemical iron-oxidation methods and nuclearly generated ozone treatments are being researched, along with a two-stage limestone-lime treatment. Other project under study include reverse osmosis, neutralosis (a combination of neutralization and reverse osmosis), freezing, electrodialysis, foam fractionation, distillation, and ion-exchange processes. (See also W74-00794) (Brown-IPC)
W74-00796

WATER REUSE IN INDUSTRY, PART 4 -- METAL FINISHING,
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
R. J. Campbell, and D. K. Emmerman.
Mechanical Engineering, Vol 95, No 7, p 29-32, July 1973. 2 fig, 2 tab.

Descriptors: *Industrial water, *Water reuse, *Desalination processes, *Freezing, *Freeze drying, Metallurgy, *Waste water treatment, Water pollution sources, Pollution abatement, Water pollution treatment, Heavy metals, Metals, Temperature, Dissolved solids, Energy, Costs, Operating cost, Demineralization.
Identifiers: *Metal finishing industry, Chemical recovery.

The technique of seawater desalination by freezing is eminently applicable to the treatment and recycling of metal-plating waste waters to minimize the discharge of heavy metals and dissolved solids. Its main advantages include low-temperature operation, low energy requirements, avoidance of membranes and other surfaces, and no volatiles carryover. A schematic description of the freeze-concentration and recovery process is presented, and its operating parameters and economic aspects are discussed. (See also W74-00794) (Brown-IPC)
W74-00797

WATER REUSE IN INDUSTRY, PART 5 -- THE WATER POLLUTION CONTROL ACT: REACHING TOWARD ZERO DISCHARGE,
Polytechnic Inst. of Brooklyn, N.Y.
D. F. Othmer.
Mechanical Engineering, Vol 95, No 9, p 32-37, September 1973. 1 fig.

Descriptors: *Discharge (Water), *Water reuse, *Water pollution treatment, *Waste water treatment, *Industrial wastes, *Pollution abatement, Legislation, Research and Development, Economic feasibility, United States, Aquatic bacteria, Dissolved oxygen, Biochemical oxygen demand, Oxidation, Oxygeneration, Recycling, Coagulation, Flocculation, Sedimentation, Biological treatment, Color, Phosphates, Enzymes, Activated sludge, Activated carbon, Chlorination.

The mandate given by Congress to the EPA under the Water Pollution Control Act envisions a goal of zero-pollution discharge into rivers within the next twelve years, beginning with immediate application of the best practical control technology available. Developing appropriate methods and standards will strain both the ingenuity of engineers and the pocketbook of industries. Nevertheless, in view of the dangers of continuing present levels of allowable pollution (such as bacterial hazards and oxygen depletion), the ancient philosophy of waste disposal by dilution must give way to optimized primary, secondary, and tertiary treatments for maximum product recovery and water recycling. Promising approaches to this direction are discussed, including clarification by coagulation, flocculation, and sedimentation of solids; activated sludge and other biochemical treatments; wet combustion and chemical oxidation, including oxygen- or enzyme-aided oxidations; and removal of phosphates, coloring matter, and other specific pollutants from municipal and industrial wastes by activated carbon adsorption, chlorination, and the like. (See also W74-00794) (Brown-IPC)
W74-00798

WATER SUPPLY AND WASTE DISPOSAL POLICY REVIEW.
Indian Nations Council of Governments, Tulsa, Okla.

Working Paper IWS-6, March, 1970. 31 p, 13 ref. HUD Oklahoma P-117.

Descriptors: *Water resources development, *Federal project policy, *Regional development, *Water policy, Water supply, Waste water disposal, Oklahoma, Cost sharing, Projects, Cost allocation, State governments, Administrative agencies, Interstate compacts.

A review of federal, state, and local policy for water supply and waste disposal is presented. It is noted that the federal government only recently became active in the environmental issues of sanitation. Although much legislation has been passed, especially for grant programs, this legislation has had several shortcomings. For example, money authorized to be spent is not alway appropriated by Congress. Secondly, the programs often require state and local governments to contribute to the funding; these government units often are already had pressed financially. The State of Oklahoma has set up what seems to be an adequate framework for water supply and waste disposal projects. The State has entered into interstate agreements for water resources development. It has also established departments to guide future water resources development within the State. Regionalization of plans is stressed, as it is on the federal level. Regional plans can include water supply and waste disposal, as well as flood control, stream regulation, land reclamation, and other water resources related projects. Funding, however, appears to be inadequate on the State level. (Poertner)
W74-00809

REMOVAL OF AMMONIA NITROGEN BY BREAKPOINT CHLORINATION USING AN ACTIVATED CARBON CATALYST,
New York State Dept. of Environmental Conservation, Albany.
W. N. Stasiuk, L. J. Hetling, and W. W. Shuster.
Technical Paper, No 26, April, 1973. 31 p, 7 fig, 1 tab, 1 appendix.

Descriptors: *Waste water treatment, *Nitrogen, *Ammonia, *Chlorination, Activated carbon, Laboratory tests, Water pollution, Water pollution control, Municipal wastes, Industrial wastes, Nitrogen compounds.
Identifiers: *Breakpoint chlorination.

The fate of ammonia nitrogen when chloramines were reacted with activated carbon was investigated in a laboratory study. Activated carbon catalyzed chloramine decomposition reactions and, depending on the pH and the ratio of chlorine to ammonia, 100 percent of the ammonia nitrogen could be removed at a chlorine-to-ammonia molar ratio slightly greater than 1.5. An end product of the reaction was found to be trace amount of nitrate, with nitrates increasing with an increased pH. The use of activated carbon by adsorption of chloramines was studied as an alternative to other methods of ammonia nitrogen removal. Removal of ammonia nitrogen is desirable as nitrogen can be the influencing factor on algae growth, and it has a direct oxygen demand. The alternative methods of nitrogen removal include: (1) biological nitrification-denitrification, (2) selective ion-exchange, (3) air stripping at elevated pH, and (4) breakpoint chlorination. This report describes the results of the breakpoint chlorination method using an activated carbon catalyst. (Poertner)
W74-00810

A GUIDE TO CHEMICAL AND CLARIFIER SELECTION FOR WASTE WATER TREATMENT,
New York State Dept. of Environmental Conservation, Albany.
T. J. Tofflemire, and L. J. Hetling.
Technical Paper No. 29, April, 1973. 12 p, 2 tab, 31 ref.

Descriptors: *Waste water treatment, *Reviews, *Sewage treatment, *Chemical precipitation, Documentation, Publications, Coagulation, Phosphorus, Treatment, Industrial wastes, Municipal wastes, Effluents.
Identifiers: *Chemical treatment, *Clarifiers, Phosphorus removal.

The increasing need for higher quality wastewater treatment and phosphorus removal has led to the consideration of chemical coagulation. Some of the coagulants that can be used include lime, alum, iron salts, and organic polymers. Many studies have been carried out on the use of each of these in individual situations. Although individual conditions will govern the use of a particular chemical, this publication is intended to serve as a guide in narrowing the available coagulants for final choice. Often the optimum chemical dosage for coagulation of sewage colloids is not the same as the optimum dosage for phosphorus removal; although the practical purposes the dosages are frequently in the same range. For example, suspended solids coagulation increases with increased lime dosage, and phosphorus removal is independent of dosages. An influent phosphorus content of 15 mg/l or 5 mg/l can both be reduced to 1 mg/l by the same lime dosage. For iron and aluminum salts, however, a ratio of 1:1 or 2:1, metal to P-mole ratio, is best. Increases beyond this level are often better for coagulation, although higher dosages can increase turbidity and colloidal solids. Other factors needing consideration are the point of chemical addition, design of clarifiers, effect of the chemicals on the handling of sludge, and effect of sludge on land. (Poertner)
W74-00811

PHASE I COMPREHENSIVE WATER AND SEWER PLAN.
Mid-Missouri Regional Planning Commission, Jefferson City.
For primary bibliographic entry see Field 06A.
W74-00813

ENHANCING TRICKLING FILTER PLANT PERFORMANCE BY CHEMICAL PRECIPITATION,
Richardson, Tex.
R. E. Derrington, D. H. Stevens, and J. E. Laughlin.
Copy available from GPO Sup Doc as EP1.23:670-73-060, $1.45; microfiche from NTIS as PB-224 929/0, $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-060, August 1973. 117 p, 45 fig, 6 tab, 10 ref. Grant No S800685. EPA Project 11010 EGL.

Descriptors: Biological treatment, *Chemical precipitation, Oxygen demand, *Phosphorus, Suspended solids, *Tertiary treatment, *Trickling filters, *Waste water treatment, Activated carbon, Biochemical oxygen demand, Chemical oxygen demand, Coagulation, Colloids, Data processing, Dispersion, Diurnal distribution, Domestic wastes, Feeding rates, *Filtration, Flocculation, Laboratory tests, Nutrient removal, Sedimentation, Sewage treatment, Sludge disposal, *Texas, Tracers, Treatment facilities.
Identifiers: *Richardson (Texas).

Two years of plant scale studies indicated metal addition was an effective effluent polishing technique at this conventional wastewater treatment plant. Effluent phosphorus (P), five-day BOD and suspended solids were reduced to 0.5, 5, and 7 microgram/l respectively. Aluminum sulfate was more effective than ferric chloride. Alum addition ahead of the final clarifier proved the best arrangement. An optimum mole ratio (metal/phosphorus) of 1.6 developed; this ratio shows moles of aluminum fed per mole of incoming total phosphorus. Chemical costs, of which one-third was for transportation, were 5 cents per 1,000 gallons of flow treated, or 36 cents per pound of phosphorus removed when in the 96 percent reduction range. Chemical addition doubled the volume of digested sludge but dewatering on

sand beds took half as long as previous conventional operations. During this demonstration the treatment system received some 1.6 mgd of typical domestic discharge, essentially its design loading. Hydraulic loading on clarifiers was minimized by drastic reduction of recirculation flows. (EPA)
W74-00835

ALUM ADDITION TO ACTIVATED SLUDGE WITH TERTIARY SOLIDS REMOVAL,
District of Columbia Dept. of Environmental Services, Washington.
A. B. Hais, J. B. Stamberg, and D. F. Bishop.
Copy available from GPO Sup Doc as EP1.23:670-73-037, $0.65; microfiche from NTIS as PB-225 028/0, $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-037, August 1973. 25 p, 7 fig, 5 tab, 8 ref. EPA Project 11010 EYM. Contract 14-12-818.

Descriptors: *District of Columbia, Pilot plants, *Aeration, Hydrogen ion concentration, *Waste water treatment, *Activated sludge, Biochemical oxygen demand, *Filtration, Sludge treatment, Suspended solids, Chemical precipitation, Phosphates, Filters.
Identifiers: Aluminum phosphate precipitation, *Alum addition, Step aeration, Multi-media filters.

The activated sludge system was operated with 4.0 hours aeration time (based on the influent flow) and an overflow rate in the secondary settler of 425 gal/ (day) (sq. ft.). Alum was dosed assuming an influent phosphorus concentration of 8.15 mg/l as P. Lime (25 mg/l) was added to the mixed liquor to stabilize the wastewater during periods of low alkalinity. The dual-media filter (24-inch bed depth) and the tri-media filter (40-inch bed depth), each loaded with secondary effluent at 2.4 gal/ (min.) (sq. ft.), regularly exhibited filter runs between 24 and 32 hours. When operating the step aeration with the usual final stage mixed liquor pH (6.7-6.9), the complete system with tri-media filtration removed 92% of the suspended solids, 96% of the BOD and 93% of the phosphorus from the primary effluent. Daily fluctuations in the final pass pH, however, corresponded to similar fluctuations in phosphorus removal. Furthermore, the removal of suspended solids, BOD and phosphorus all increased to 97% during those periods when the final pass pH was between 6.3 and 6.6. Operation at pH below 6.2 caused an upset in the activated sludge. (EPA)
W74-00837

RESTORE RURAL WATER AND WASTE DISPOSAL GRANT PROGRAMS.
For primary bibliographic entry see Field 05G.
W74-00875

PROCESS FOR TREATING WASTE WATER CONTAINING NITRILES,
Sumitomo Shipbuilding and Machinery Co., Ltd., Tokyo (Japan). (Assignee)
Y. Fujii, and T. Oshimi.
U.S. Patent No. 3,756,947, 4 p, 3 tab, 1 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 281, September 4, 1973.

Descriptors: *Patents, *Activated sludge, *Waste water treatment, Water purification, Microorganisms, Bacteria.
Identifiers: *Cyanide, *Nitriles, *Achromobacter nitriloclastes, *Alcaligenes viscolactis.

At least one microorganism capable of degrading nitriles and cyanides, selected from the genera Alcaligenes and Achromobacter is added to an activated sludge to acclimate the microorganism to the sludge. The waste water containing nitriles and cyanides is passed through the activated sludge containing the acclimated microorganisms to purify the waste water. Two particularly useful strains Alcaligenes viscolactis S-2 ATTC (FERM-P No 759) and Achromobacter nitriloclastes S-10 ATCC 21697 (FERM-P No 760) were isolated. Diagnostic characteristics of the microorganisms are tabulated. Test information is included. (Sinha-OEIS)
W74-00957

METHOD OF PURIFYING SEWAGE EFFLUENT AND APPARATUS THEREFOR,
B. Greenberg.
U.S. Patent No. 3,756,933, 7 p, 7 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 278, September 4, 1973.

Descriptors: *Patents, *Industrial wastes, *Sewage treatment, *Water purification, *Waste water treatment, Polyelectrolytes, Metals, Phosphorus, Nitrogen, Carbon, Aluminum, Calcium, Magnesium, Chlorides.
Identifiers: *Electrolytic treatment.

Sewage or industrial wastes are electrolytically treated by circulating the liquid past the cathode and upward with the cathode evolved hydrogen to raise the pH of the circulating liquid and precipitate, flocculate and float the alkaline earth products. The floated materials are separated from the liquid, and the liquid so depleted then flows downward, and any unfloated material is returned to the cathode upward liquid flow, and at least part of the liquid is withdrawn from the lower part of the downward flow. It is then exposed to the oxygen and chlorine bubbles evolved at the anode. Wastes treated refer particularly to organic materials which are anionic polyelectrolytes and their precursors, including compounds of phosphorus, nitrogen, carbon or other elements, and a dissolved polyvalent metal such as aluminum, calcium, or magnesium and chloride ions. (Sinha-OEIS)
W74-00958

SEWAGE TREATMENT PROCESS,
Biospherics, Inc., Rockville, Md. (assignee)
G. V. Levin, and G. J. Topol.
U.S. Patent No. 3,756,946, 2 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 280, September 4, 1973.

Descriptors: *Patents, *Sewage treatment, *Activated sludge, *Aeration, Biological Oxygen demand, Phosphates, Microorganisms, Anaerobic conditions, *Waste water treatment.

Sewage is mixed with activated sludge. The mixture is passed to an aeration zone where the BOD content is reduced and microorganisms take up phosphate. The product is then passed to a settling zone containing an anaerobic layer of sludge. In this zone phosphate-enriched sludge settles into the anaerobic lay of sludge and a substantially phosphate-free effluent is removed from above the layer of sludge. The sludge is maintained under anerobic conditions in the sludge layer of the settling zone for a time sufficient to cause the organisms in the sludge to release phosphate to the liquid phase of the sludge. Sludge containing soluble phosphate is removed from the settling zone. The sludge is then treated to separate a phosphate-enriched aqueous phase and to provide a sludge having a higher concentration of solids and a lesser concentration of phosphate. This sludge is recycled for mixing with influent sewage material. (Sinha-OEIS)
W74-00960

SEWAGE DISPOSAL EFFLUENT PURIFIER,
Moody Aquamatic Systems, Inc., Meadville, Pa. (assignee)
D. L. Moody, and V. R. Troglione.
U.S. Patent No. 3,756,410, 5 p, 6 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 154, September 4, 1973.

Descriptors: *Patents, *Liquid wastes, *Sewage treatment, *Water purification, *Waste water treatment.

Liquid sewage is fed to a contact tank where it passes through a porous filter that removes any remaining solids. Ozone gas is bubbled through it to oxidize the impurities and remove objectionable odors. An ozone gas diffuser is mounted in the tank beneath the filter so that excess ozone will pass upward through the filter to keep it purified. (Sinha-OEIS)
W74-00962

SYSTEM FOR ELIMINATING ENVIRONMENTAL POLLUTION,
H. E. De Bord.
U.S. Patent No. 3,756,171, 4 p, 6 fig, 16 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 94, September 4, 1973.

Descriptors: *Patents, *Incineration, Solid wastes, *Waste treatment, *Filtration, *Municipal water.

A system for the disposing of rubbish without polluting the environment includes an incinerator for initially burning the rubbish; this incinerator includes a water bath for catching and cooling the noncumbustibles therein. A conveyer belt conveys the noncombustible material from the furnace for refining and reuse. A blower takes a suction on the smoke in the fire box of the incinerator and draws it through a compression box where it is scrubbed with water, filtered and then deposited in a final bath tank. The water in the bath tank is subsequently purified in a filter box, and is then deposited directly into the municipal drain system. (Sinha-OEIS)
W74-00964

METHOD FOR BIOCHEMICAL TREATMENT OF INDUSTRIAL WASTE WATER,
S. V. Yakovlev, J. V. Voronov, V. N. Korenfov, A. B. Nevsky, and V. A. Dobrikova.
U. S. Patent No. 3,755,156, 6 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 913, No 4, p 1252, August 28, 1973.

Descriptors: *Patents, *Industrial wastes, *Municipal wastes, *Waste water treatment, Metals, Chromium, Chlorine, Activated sludge, *Oxidation, Chemical reaction, Biochemical Oxygen Demand.

Industrial waste water which contains combined oxygen in the form of inorganic compounds of hexavalent chromium, chlorine or mixtures thereof, is mixed with municipal sewage containing organic matter. The mixture is subjected to mechanical purification. The mixture is then fed to an unaerated tank to effect simultaneous biochemical reduction of the inorganic oxygen-containing compounds by the activated sludge and biochemical oxidation of the organic matter. The mixture is then fed to the settler, while the precipitated activated sludge is returned to the unaerated tank. (Sinha-OEIS)
W74-00966

PROCESS FOR TREATING INDUSTRIAL WASTES,
S. Bastacky.
U.S. Patent No. 3,755,102, 3 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 913, No 4, p 1240, August 28, 1973.

Descriptors: *Patents, *Industrial wastes, *Waste water treatment, Acids, Evaporation, *Electrolysis, Evaporation.
Identifiers: *Sulphuric acid, Spent pickle liquor.

A process is presented for treating spent sulphuric acid industrial wastes by a combination of

evaporation and electrolysis. The wastes are treated in cells having several alternately positioned positive and negative aluminum electrodes. The electrodes can be plate form, corrugated sheet form, pipe form or a combination of these. Direct current is applied and the polarity of the electrodes can be changed to preserve the electrodes. A solid residue forms which can be further reduced by an ignition step and the metal removed by cleaning or pickling can be reclaimed. (Sinha-OEIS)
W74-00967

INERT GAS STRIPPING OF CONTAMINATED WATER,
Texaco, Inc., New York. (assignee)
R. D. Kent.
U.S. Patent No. 3,754,376, 3 p, 2 fig, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 913, No 4, p 1069, August 28, 1973.

Descriptors: *Patents, *Waste water treatment, Ammonia, Carbon dioxide, Hydrogen sulfide, *Gases, Water pollution.
Identifiers: *Stripping process.

Water containing contaminating gases such as hydrogen sulfide, carbon dioxide and ammonia is freed of these contaminants by a closed system stripping process which employs an inert gas and steam. At a given temperature ammonia, carbon dioxide and hydrogen sulfide will be efficiently stripped if some inert gas is present. Solids will have less tendency to form since the equilibrium between solid such as ammonium bisulfide and ammonium carbonate, for instance, will be more in favor of the gases making up the solids. The mixture of inert gas stripped gases is passed through absorbing means to separate the inert gas from the stripped gas. The inert gas is then recycled by means of a compressor to be reused for stripping purposes. (Sinha-OEIS)
W74-00969

STORM DRAINAGE STUDY, (CHATHAM COUNTY-SAVANNAH, GEORGIA).
Chatham County-Savannah Metropolitan Planning Commission, Savannah, Ga.
For primary bibliographic entry see Field 04A.
W74-01031

WATER AND SEWER SERVICE NEEDS OF LOW AND MODERATE INCOME HOUSEHOLDS IN METROPOLITAN WASHINGTON.
Metropolitan Washington Council of Governments, D.C.

Available from the National Technical Information Service as PB-217 529, $3.00 in paper copy, $1.45 in microfiche. Housing Information Report No 2. Final Report. December, 1972. 70 p, 3 append.

Descriptors: *Planning, *Coordination, *Plumbing, Administration, Institutional constraints, Financing, Costs, Water allocation (Policy), Domestic wastes, Water demand, *District of Columbia.
Identifiers: Service coordination and delivery, Plumbing needs, Planning strategy, *Washington, D.C.

Over 16,000 households in the Washington Metropolitan Area do not have access to adequate water and sewer service because of a lack of complete plumbing facilities. The task of alleviating this problem is hindered by three major difficulties: (1) there is a conflict between development policies aimed at planning the orderly growth of the metropolitan area and the provision of necessary services to low income residents living in rural or low density areas; (2) there are high costs to both residents without services and the local jurisdiction or agency empowered with authorizing water and sewer service; (3) federal, state, and local funding is often inadequate and definitions of program eligibility are narrow. Current federal, state, and local programs are analyzed. Development of a program strategy is primarily dependent on coordination of information, of development goals with human resource goals, and coordination and expansion of federal, state, and local programs. Contained in the appendices are data on the water and sewer problem, a schedule of connection and plumbing installation costs, and examples of local assistance programs. (Hoffman-North Carolina)
W74-01034

ENVIRONMENTAL IMPACT STUDY FOR EXPANSION ON THE VILLAGE CREEK SEWAGE TREATMENT PLANT,
Advanced Technology Center, Inc., Dallas, Tex.
E. M. Wilkins, D. H. Petersen, and J. D. Suggs.
Available from the National Technical Information Service as PB-220 024, $4.25 in paper copy, $1.45 in microfiche. Prepared for Department of City Planning, Arlington, Texas. September, 1972. 41 p, 6 fig, 6 ref, 3 append. HUD CPA-TX-06-16-1046.

Descriptors: *Odor, *Path of pollutants, *Dispersion, Effluents, Methodology, *Texas, *Air pollution.
Identifiers: *Climatic effects, *Temperature inversion, Temperature lapse conditions, Odor concentration, Arlington (Tex), Trinity River basin (Tex).

Temperature lapse conditions (Type B) and temperature inversion conditions (Type E) were chosen as representative of the two major types of diffusion regimes. Winds follow the Trinity River basin during inversion conditions, affecting the city of Arlington 22% of the time annually. Wind directions are not stable during non-inversion conditions, although the effect on the city would total 20% annually. Sewage treatment plant expansion would have little effect on calculated odor concentration isopleth patterns; the important difference would be the increase in the emission rate. The 'effective source strength' concept was utilized for analysis. The threshold odor concentration at a known downward distance from the source was observed, with the magnitude of the source required to account for the observed concentration computed using diffusion theory. Under Type B conditions, the expanded plant emission rate was calculated as 1.87 x 108 odor units/second. Under Type E conditions, the rate of vertical mixing of the effluent with the air stream is very slow, and therefore less condusive to long-distance transport of odorous gases than the temperature lapse condition. However, this could also result in a temporary 'fumigation' downwind once the inversion condition ceased besides possible oxygen starvation in the stagnation area. The new emission rate would be 1.47 x 106 odor units/second. Generally, odor concentrations would be increased by as much as a factor of five. The amount of inhabited area covered by above threshold conditions would be increased by more than a factor of 8. Tables detail the exact figures for both Type B and Type E conditions. (Hoffman-North Carolina)
W74-01035

WATER AND SEWER PLAN UPDATE, (GRAY, GEORGIA).
Middle Georgia Area Planning Commission, Macon.

Available from the National Technical Information Service as PB-219 464, $3.50 in paper copy, $1.45 in microfiche. Report No. MG APC-72-8. April 1973. 19 p, 2 maps, 4 tab. CPA-GA-04-04-1001.

Descriptors: *Water supply, *Sewerage, Costs, Planning, *Georgia.
Identifiers: Water system expansion, *Sewer system expansion, *Gray (Ga.).

A status evaluation is presented of the 11 uncompleted water and sewer programs which have been approved by the Middle Georgia Area Planning Commission through the A-95 review process. Each program is described, with total cost and proposed methods of financing included. Four projects--Gray, Forsyth, Jeffersonville and Perry--are proceeding with final construction plans. Factors that have prohibited development of other projects are: (1) freeze on water and sewer financial assistance programs and (2) prior to the freeze lack of grant money in federal water and sewer assistance programs. Proposed methods for financing the uncompleted projects are given. The improvement program for the city of Gray, which includes additions to both the water system and the sewer system, is summarized. Two additional wells will supplement the present water supply. The water treatment capacity is to be doubled, and a ground storage reservoir will be constructed. Tables detail costs. (Hoffman-North Carolina)
W74-01036

A SUMMARY REPORT MASTER WATER AND SEWERAGE PLAN.
CIM, Inc., San Luis Obispo, Calif.

Prepared for San Luis Obispo County, Calif. December, 1972. 34 p, 5 tab, 8 maps.

Descriptors: *Water supply development, *Sewerage, *California, Desalination processes, Groundwater, Planning, Costs, Networks, Coordination, Water reuse, Treatment facilities.
Identifiers: *San Luis Obispo County (Calif.), Water system expansion, Sewerage system expansion, *Nacimiento Dam (Calif).

The objective was to prepare a county-wide plan of coordinated expansion of water and sewerage systems. The extensive size of the county and the presence of major mountain ranges within the county precluded any single generalized approach. Economic evaluations compared capital requirements for alternate water supply and sewerage facilities. For water supply facilities, a factor for comparison of the net cost per unit of water delivered to users in each specific service area was used to determine equivalent unit water costs. Development of water from Nacimiento Reservoir and from the State Water Project was deemed the most feasible combination for water supply sources. Scheduling, size, capacity, and construction costs for proposed facilities are included. The comprehensive sewerage plan emphasizes the need for elimination of ocean discharge of treated effluent from existing wastewater treatment plants in favor of a wastewater reclamation program. Specific recommendations for the individual service areas are included. (Hoffman-North Carolina)
W74-01041

SEWERAGE MASTER PLAN, EUGENE-SPRINGFIELD URBANIZING AREA.
Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Ore.

Prepared for Lane Council of Governments, Eugene, Oregon. 1970. 164 p, 57 fig, 52 tab, 25 ref, 6 append. ORE.P-116.

Descriptors: *Sewerage, *Planning, *Oregon, *Urban hydrology, Water quality control, Projections, Costs, Coordination, Urbanization.
Identifiers: *Sewerage system expansion, Eugene (Ore), Springfield (Ore).

To define the need for new sewerage facilities, estimates of sewerage flows and characteristics were made. High infiltration not only complicated

flow projections but were the source of present, and possibly future, excessive flows. Due to anticipated increased water quality standards by 1990, plants were designed to provide secondary treatment of all wastes with BOD and SS removals over 95% by 1990. The study area was divided into 2 parts: the central study area of 160 square miles, including Springfield and Eugene; and subareas consisting of the 7 outlying communities. Because of the distance from the present urbanized area and small populations, the outlying communities were not included in central sewerage system short-term plans but were considered separately. The recommended plan included: a single regional sewerage treatment plant to ultimately serve the entire study area; a system of interceptor sewers; and pumping stations as required for lifting the sewerage for delivery to the regional treatment plant via the trunk system. A major sewer cleaning, inspection, and sealing program, preceded by a project to review present sealing techniques, was recommended. Prevailing construction costs were used to compare alternative projects on a first and annual cost basis. (Hoffman-North Carolina)
W74-01042

WATER SUPPLY AND SEWAGE FACILITIES PLAN UPDATE-1970.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 06B.
W74-01045

AREAWIDE WATER AND WASTE WATER PLANNING STUDY FOR THE ST. CHARLES MESA, RYE-COLORADO CITY, AND BEULAH SECTORS OF PUEBLO COUNTY.
Sellards and Grigg, Inc., Lakewood, Colo.

Prepared for the Pueblo Regional Planning Commission, Pueblo, Colorado. March, 1973. 110 p, 27 fig, 27 tab, 15 ref, 2 append.

Descriptors: *Water supply, *Sewerage, *Planning, *Water quality control, Land use, Water demand, Water quality standards, Water sources, Water rights, Design criteria, Costs, *Urbanization, Treatment facilities, Projections, Colorado.
Identifiers: Joint facilities, Pueblo County (Colo), St. Charles Mes (Colo.), Rye-Colorado City (Colo.).

An engineering-oriented water supply and wastewater disposal study is described for three planning areas in Pueblo County. The plans are closely related to the comprehensive land use planning for the County and are based largely on future urban growth and demands, engineering criteria, and water quality standards and requirements. Each of the three planning areas is treated separately with the analyses including (1) discussions of the existing water and sewer systems in terms of water demand, water rights, water storage, water distribution, sewage treatment and disposal, and adequacy of receiving streams to accept wastes; (2) investigations of the possibilities of joint and/or multiple use of system facilities; and (3) recommendations for specific facilities and programs for both the short term (1978) and the long term (1993). The need for flexibility over the long term to meet changing standards and technology is emphasized. Some of the considerations and criteria used in the analyses include population projections, land use plans, water demands, stream flows, water quality standards, water rights, and past system performances. Water supply sources include shallow wells, deep wells, and diversions from rivers. Two possible waste disposal alternatives are land disposal and temporary retention of effluent during low flow periods. (Elfers-North Carolina)
W74-01047

COMPLEMENTARY ROLE OF IRON (III), SULFATE AND CALCIUM IN PRECIPITATION OF PHOSPHATE FROM SOLUTION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
P. H. Hsu.
Environmental Letters, Vol 5, No 2, p 115-136, 1973. OWRR A-031-NJ (2).

Descriptors: *Phosphate, *Nutrient removal, Chemical precipitation, *Iron compounds, *Calcium compounds, *Sulfates, *Waste water treatment.

The purpose of this research is to find more economical and reliable ways of eliminating phosphate from waste water by means of compounds of iron. The effectiveness of iron (III) to precipitate phosphate varied greatly with the P/Fe ratios present. For a given P/Fe ratio, effective precipitation was observed only in a certain range of OH/Fe ratios. The solution acidity corresponding to the optimum OH/Fe ratio varied from nearly netural with P/Fe mole ratio ± 0.2 to pH 2.6 - 2.9 with P/Fe mole ratio ± 2. The effectiveness of phosphate precipitation was greatly improved on the acidic side of the optimum region by the addition of SO4± and the alkaline side by addition of Ca2+. When both SO4± and Ca2+ were present, phosphate was effectively precipitated throuh/fe ratios investigated, corresponding to a pH range of 2.6 to 8. Also, with low P/Fe ratio in preparation, the residual phosphate concentration was low but the amount of phosphate precipitated per mole of iron (III) was also low. With high P/Fe ratio in preparation, nearly one mole of phosphate was removed per mole of iron (III), but a considerable amount of phosphate remained in solution.
W74-01053

EFFECT OF DETERGENT APPLICATION ON THE GROWTH OF CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 03C.
W74-01057

5E. Ultimate Disposal of Wastes

PERMEABILITY RESTORATION IN UNDERGROUND DISPOSAL RESERVOIRS,
Alabama Univ., University. Natural Resources Center.
D. M. Grubbs, C. D. Haynes, and G. P. Whittle.
Available from the National Technical Information Service as PB-224 915/9, $9.25 in paper copy, $1.45 in microfiche. Report 733, September 1973. 138 p, 27 fig, 8 tab, 16 ref, 2 append. OWRR A-032-ALA (1).

Descriptors: *Waste disposal wells, *Permeability, *Industrial wastes, *Underground storage, Underground waste disposal, Boreholes.
Identifiers: *Pre-injection treatment, Borehole reaming.

Conclusions on permeability restoration include: The injection of reactive liquid wastes into underground disposal reservoirs will impair permeability as a result of the interaction of waste liquids and the rock matrix and pore materials. The decline in permeability will generally stabilize and maintain an asymptotic relationship to the low value reached. Permeability and hence the capacity of a reservoir to accept wastes without resorting to excessive input pressures can be improved by one or more of several restoration techniques. Reaming of the face of the borehole is generally an effective means of permeability restoration. Chemical treatment by injection of acids (such as dilute hydrochloric) is effective in restoring permeability in sandstone reservoirs. Underreaming of the borehole in the laboratory investigation was effective in the restoration of permeability in carbonates much the same as the improvement in permeability in sandstone reservoirs. In designing liquid waste disposal systems, laboratory studies employing reservoir rock specimens and samples of the waste to be injected may lead to the selection of appropriate and effective procedures for permeability restoration. The capacity of the reservoir to accept a given volume of waste within the design criteria for pressure requirements should then contribute to the economic feasibility of this method of waste disposal. A broader use of underground waste disposal will complement the national effort to rid surface streams of their role as carriers of noxious wastes.
W74-00554

SPRAY DISPOSAL OF SEWAGE EFFLUENT,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-00572

PROBLEM DEFINITION STUDY: EVALUATION OF HEALTH AND HYGIENE EFFECTS OF THE DISPOSAL OF PESTICIDES AND PESTICIDE CONTAINERS,
Army Medical Environmental Engineering Research Unit, Edgewood Arsenal, Md.
For primary bibliographic entry see Field 05G.
W74-00580

SUMMARY REPORT: PILOT PLANT STUDIES ON DEWATERING PRIMARY DIGESTED SLUDGE,
Los Angeles County Sanitation District, Calif.
For primary bibliographic entry see Field 05D.
W74-00700

SOLID WASTE MANAGEMENT PLAN, COWLITZ AND WAHKIAKUM REGION.
Cowlitz, Wahkiakum Regional Planning Commission, Kelso, Wash.
For primary bibliographic entry see Field 05D.
W74-00747

BLEACHING EFFLUENT FOR IRRIGATION,
Stephen F. Austin State Coll., Nacogdoches, Tex.
For primary bibliographic entry see Field 05D.
W74-00787

OCEAN WASTE DISPOSAL IN SELECTED GEOGRAPHIC AREAS.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.

Available from the National Technical Information Service as PB-224 793, $8.00 in paper copy, $1.45 in microfiche. Interim Report 4460C 1541, July 1973. 394 p, 29 fig, 31 tab, 129 ref. EPA Contract 68-01-0796.

Descriptors: *Waste disposal, Coasts, Sites, Outlets, Management, Harbors, Municipal wastes, Oceans.
Identifiers: *Ocean waste disposal, *Coastal zone management, Dredge spoil disposal, Hazardous materials.

Results are presented of an intensive face finding survey of ocean waste disposal practices in six geographic areas. The areas were the New York Bight; Charleston, South Carolina; segments of the Gulf of Mexico Coast; Southern California; San Francisco; and Puget Sound. Ocean disposal sites within these areas were selected to provide a representative cross section of ocean waste disposal practices in the United States.ncurrent with a field survey and personal interview program, detailed data and information research was performed. The information obtained by this coordinated program was used to establish a data base,

which will be used to recommend guidelines for the control of ocean waste disposal. (EPA)
W74-00928

WATER DISPOSAL CAISSON AND METHOD OF USING SAME,
For primary bibliographic entry see Field 05G.
W74-00963

5F. Water Treatment and Quality Alteration

WATER SUPPLY AND WASTE DISPOSAL POLICY REVIEW.
Indian Nations Council of Governments, Tulsa, Okla.
For primary bibliographic entry see Field 05D.
W74-00809

PHASE I COMPREHENSIVE WATER AND SEWER PLAN.
Mid-Missouri Regional Planning Commission, Jefferson City.
For primary bibliographic entry see Field 06A.
W74-00813

TRENDS IN DEVELOPMENT OF WATER TREATMENT FOR POPULATED REGIONS (TENDENTSII RAZVITIYA OBRABOTKI VODY DYLA NASELENNYKH MEST),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
L. N. Fal'kovskaya.
Vodnyye Resursy, No 1, p 55-64, 1973. 2 tab, 35 ref.

Descriptors: *Water treatment, *Water purification, *Water quality, *Potable water, *Public health, Odor, Taste, Coagulation, Filtration, Disinfection, Fluoridation, Municipal water, Construction costs.
Identifiers: *USSR.

The effects of potable-water quality on the health of a community are examined. Principal methods of water purification (chemical coagulation, filtration, disinfection, taste and odor control) and ways of increasing operational efficiency of purification facilities are described, and basic trends in scientific investigations on development of municipal water supplies are outlined. (Josefson-USGS)
W74-00841

A BILL TO BE KNOWN AS THE 'SAFE DRINKING WATER ACT OF 1973'.

Senate Bill 433, 93rd Cong, 1st Sess (1973), 35 p.

Descriptors: *Potable water, *Public health, *Water purification, *Water quality standards, *United States, Legislation, Water pollution treatment, Odor, Pollutants, Organic wastes, Governmental interrelations, Planning, Government finance, Research and Development.
Identifiers: *Hazardous substance, *Safe Drinking Water Act of 1973, Administrative regulation.

Increasing quantities and types of chemicals, bacteria, toxic metals, and other contaminants are entering the public water systems that serve as sources which supply the American people with water for drinking. Many of these contaminants are either not detected or are not removed by established water testing and treatment methods and they are thus consumed by or come in contact with the public, thereby presenting hazards to the public health. The federal government has the responsibility of establishing minimum national drinking water standards for all public water systems. The Administrator of the Environmental Protection Agency (Administrator) is charged with formulating and issuing such standards which shall prescribe the maximum permissible levels of any contaminants. States are given the primary enforcement responsibility for the standards, but if the Administrator finds any state failing to comply with the prescribed standards, he may request the Attorney General to take action against the state. There is established in the Environmental Protection Agency a National Drinking Water Council which shall make recommendations to the Administrator on matters relating to drinking water standards. The Administrator is authorized to make grants to the states to assist them in establishing and maintaining adequate programs to assure the safety of public drinking water. (McKnight-Florida)
W74-00856

REDUCTION OF HIGH NITRATE CONTENT FROM WELL WATER IN A REMOTE ESKIMO VILLAGE,
Artic Health Research Center, College, Alaska.
B. B. Benson.
Journal of Environmental Health, Vol 30, No 2, p 164-170, September-October, 1967. 3 fig, 3 tab, 9 ref.

Descriptors: Wells, Water wells, Water quality, Hardness, *Nitrates, *Public health, *Water treatment, *Demineralization, Potable water.
Identifiers: *Nunivak Island, *Methemoglobinemia, Nitrate poisoning.

The well water in the village of Mekoryuk is very high in nitrate: 266 mg/l in the village well and 75 mg/l in the school well. This nitrate concentration can cause methemoglobinemia in infants under two months of age if ingested. Due to village conditions and the economic situation, it is not practical to treat the entire village water supply, but only that portion used by nursing mothers and infants. By passing the water through small demineralizers made for use with steam irons, the nitrate concentration can be reduced to safe levels. The change in color of the resin from purple to yellow eliminates the need for chemical tests on the effluent to determine when the demineralizer is exhausted. (Campbell-NWWA)
W74-00949

CORROSION CONTROL IN WATER WELLS,
Black, Crow and Eidsness, Inc., Gainesville, Fla.
A. P. Black, J. I. Garcia-Bengochea, and J. R. Hurtado.
Chemical Engineering Progress Symposium Series, Vol 64, No 90, p 187-190, 1968. 3 fig, 2 tab, 6 ref.

Descriptors: Wells, *Water wells, Corrosion, Damages, Chemical reactions, *Corrosion control, Chemical analysis, *Water treatment, *Carbon dioxide.
Identifiers: *Neutralization, *Saturated lime water, Calcium carbonate scale.

The municipal water supply of the city of Maracaibo, Venezuela, is obtained from more than forty wells penetrating sand strata. While water from the various wells differs somewhat in chemical quality, water from most is very high in carbon dioxide (60 to 100 ppm) and has pH values in the range 6.1 to 6.5. Corrosion is rapid and severe, and annual replacement costs have exceeded $100,000. Field tests indicate that this condition can be corrected and corrosion practically eliminated by the addition of a saturated solution of lime water at a point in the well somewhat below the pump section. The lime saturator and the method of preparing and feeding the lime solution are described. An initial test of the method, with a new pump and column, over a period of 81 days showed that practically no corrosion took place during that period, and a second test over a period of approximately 6 months confirmed the first results. (Smith-NWWA)
W74-00952

PRELIMINARY RESULTS OF THE PROJECT FOR CONTROLLING AND PREVENTING SCHISTOSOMIASIS IN THE LOWER MANGOKY (MALAGASY REPUBLIC),
Institut Tropical Suisse, Basel.
A. A. Degremont, R. Geigy, and P. Perret.
Acta Trop, Vol 29, No 2, p 101-174, 1972, Illus, English summary.
Identifiers: Bulinus-liratus, Bulinus-obtusispira, Control, *Malagasy Republic (Mangoky), *Niridazole, Parasit-drug, Schistosoma-haematobium, Schistosoma-mansoni, *Schistosomiasis, Vector.

The aims of the Mangoky Project for controlling and preventing schistosomiasis in Lower Mangoky, Madagascar were two-fold: to check endemic schistosomiasis in the irrigated Samangoky area by simultaneously combining all the methods of schistosomiasis control: chemotherapy using niridazole; chemical treatment, using N-trityl-morpholine, of all the water where intermediate hosts were found; health education and supervision of the installation of irrigation and development of new areas and to try to define the methods of controlling and preventing schistosomiasis over newly-developed irrigated area to calculate the profitability of such a project and to plan its organization. Almost all (85%) of the approximately 10,000 inhabitants were examined and those found infected underwent treatment with niridazole. The number of Schistosoma mansoni cases diagnosed during systematic examinations was 698 (3.7%) while the number of S. haematobium cases diagnosed was 2844. Monthly or quarterly malacological investigations of about 400 habitats revealed the existence of 9 aquatic molluscs. Bulinus obtusispira was considered the main intermediate host of S. haematobium in Lower Mangoky. B. liratus was not involved in transmission of S. haematobium, although future risk of transmission by B. liratus was not completely negligible. The anti-schistosomiasis campaign carried out over 5 yr was very effective; the infection rate dropped from 13%-3% in the whole area. This project can serve as model for preventing and controlling schistosomiasis in other newly-developed irrigated regions of Madagascar and Africa.--Copyright 1973, Biological Abstracts, Inc.
W74-00992

5G. Water Quality Control

TRENDS IN ENVIRONMENTAL LAW RELATED TO WATER RESOURCES PLANNING,
Auburn Univ., Ala. Center for Urban and Regional Planning.
For primary bibliographic entry see Field 06E.
W74-00552

SUBURBAN AMERICA: POPULATION DYNAMICS AS RELATED TO WATER RESOURCES PLANNING,
Wapora, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-00553

GROUND WATER POLLUTION PROBLEMS IN MINNESOTA,
Minnesota Pollution Control Agency, Minneapolis. Div. of Water Quality.
For primary bibliographic entry see Field 05B.
W74-00570

PROBLEM DEFINITION STUDY: EVALUATION OF HEALTH AND HYGIENE EFFECTS OF THE DISPOSAL OF PESTICIDES AND PESTICIDE CONTAINERS,
Army Medical Environmental Engineering Research Unit, Edgewood Arsenal, Md.
T. A. Miller.

Available from NTIS, Springfield, Va., 22151 as AD-757 603 Price $3.00 printed copy; $1.45 microfiche. Report No 73-01, August 1972. 41 p, 3 fig, 2 tab, 126 ref, 4 append.

Descriptors: *Waste disposal, *Pesticides, *Water pollution control, Methodology, Chemical degradation, Biodegradation, Underground waste disposal, Insecticides, Herbicides, Evaluation.
Identifiers: *Thermal degradation, *Army surplus pesticides, Chemical treatment.

The disposal of Department of the Army surplus pesticides of all types presents serious problems. Significant among the various types of pesticides are large quantities of organochlorine insecticides and phenoxy acid herbicides. Thermal degradation or ground deposition are the disposal methods with the greatest potential for handling large quantities of material in these categories. Chemical treatment has disposal potential for some pesticides on a small-scale basis, and may have application in the decontamination of empty pesticide containers. Recommendations are made concerning research to determine: methods for the small-scale disposal of all types of pesticides and empty pesticide containers; thermal degradation temperatures for organochlorine insecticides and phenoxy acid herbicides, including methods for the secondary disposal of ash and scrubbing liquids; and criteria for the ground disposal of pesticides by deposition in a sanitary landfill or other special excavation, or by deposition in chemically or biologically active soils. (Woodard-USGS)
W74-00580

A REPORT OF PROGRESS AND CONCLUSIONS, (WASHINGTON, D.C. METROPOLITAN AREA WATER RESOURCES).
Washington Area Interstate Water Resources Program, D.C.
For primary bibliographic entry see Field 06D.
W74-00583

REMOTE SAMPLER FOR DETERMINING RESIDUAL OIL CONTENTS OF SURFACE WATERS,
Naval Ship Research and Development Center, Annapolis, Md.
P. Schatzberg, and D. F. Jackson.
Available from NTIS, Springfield, Va., 22151 as AD-760 217; Price $3.00 printed copy; $1.45 microfiche. Final Contract Report, October 1972. 23 p, 3 fig, 6 tab, 2 ref, 2 append. USCG Contract MIPR-Z-70099-0-00584.

Descriptors: *Oil spills, *Oil pollution, *Oily water, *Separation techniques, *Water pollution control, Model studies, Laboratory tests, Sorption, Coasts, Estuaries, Oil-water interfaces, Sampling, Monitoring, Water pollution, *Pollutant identification, Pollution abatement.
Identifiers: Oil pollution baselines.

A sample flow-through device has been developed which, in conjunction with a skimmer and pump, can process 100 to 200 liters or more of surface water, removing any oil present in a separate phase. Thus concentrated, the oil can be extracted at a laboratory, its quantity and nature determined, and when related to the volume of water processed through the sampler, provide oil concentration data on a time integrated basis. Key to the development of this device was identification of a sorbent material which would quantitatively remove oil from a moving water stream and permit simple extraction of that oil in a laboratory. A laboratory apparatus was designed to generate a flowing water stream containing various quantities of oil. Experiments showed that 5-25 ppm oil in a flowing water stream is quantitatively absorbed by the sorbent. The concentrated oil is easily removed from the sorbent with carbon tetrachloride used as solvent and a Soxhlet extractor. The sorbent is regenerated by this process and can be reused many times. Concentration of the extracted oil is determined by infrared spectrophotometry. (Woodard-USGS)
W74-00584

LOW-COST FACILITIES FOR THE BACTERIOLOGICAL EXAMINATION OF DRINKING WATER SAMPLES,
Nairobi Univ. (Kenya). Dept. of Civil Engineering.
D. D. Mara.
Water Research, Vol 7, No 8, p 1243-1245, August 1973. 1 tab, 5 ref.

Descriptors: *Water analysis, *Laboratory equipment, *Coliforms, Costs, Cultures, *Potable water, Bioindicators, *Capital costs.
Identifiers: Most probable number test, Culture media.

The equipment required to provide a small laboratory in up-country areas in developing countries with facilities for five coliform examinations (at 37C) per day by the five tube 10 ml MPN method is described. The capital cost (excluding installation, buildings, etc.) is approximately 290 dollars and the running cost per test approximately 7 cents. (Little-Battelle)
W74-00630

MARKET PROBLEMS IN THE DISTRIBUTION OF EMISSION RIGHTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
M. Rose.
Water Resources Research, Vol 9, No 5, p 1132-1144, October 1973. 3 fig, 23 ref, 4 append.

Descriptors: *Distribution, *Permits, *Bids, *Marginal costs, *Pollution abatement, Treatment, Prices, Control, Optimization, Mathematical models, Marketing, Systems analysis.
Identifiers: *Emission rights, *Waste discharge, *Cost minimization, Waste loads, Calculus.

Some of the market problems inherent in developing a system of emission rights are considered. Cases are analyzed in which there are single and multiple dischargers and in which the supply of available permits is fixed, variable, or variable up to a specified limit. An auction-type bidding process is analyzed. A public authority distributes permits providing the right to discharge specified waste loads into a medium. Potential purchasers of the permits may perceive themselves as having some measure of control over the permit prices through their bids. It is shown that given sufficient information on the nature of bidding strategies, the authority can infer the firms marginal treatment cost functions from their bidding behavior and may therefore be in a position to impose the optimal solution of discharges. In cases in which the optimal number of rights is not known but the marginal damage costs are known, the auction market can generate information that allows determination of the optimal price and number of rights to make available. The public authority should: Maximize the difference between the value of pollution damages avoided and the cost of reducing the damages (minimize the sum of the remaining damages and required treatment). This process is modeled using calculus. (Bell-Cornell)
W74-00674

MICHIGAN WATER RESOURCES ENFORCEMENT AND INFORMATION SYSTEM,
Michigan Dept. of Natural Resources, Lansing. Water Resources Commission.
G. Guenther, D. Mincavage, and F. Morley.
Copy available from GPO Sup Doc as EP1.23 73-020, $1.75; microfiche from NTIS as PB-224 800, $1.45. Environmental Protection Agency Socioeconomic Study Series, Report EPA-R5-73-020, July 1973. 161 p, 70 exhibits. EPA Project 16090 FSR.

Descriptors: *Information retrieval, Data storage and retrieval, *Data processing, Water pollution control, Monitoring, State jurisdiction, *Michigan, Data collections, Documentation, Information exchange.
Identifiers: *Water quality enforcement, Exception reporting, Computer graphics, *Information systems, STORET system.

The project demonstrated an interactive Federal/State water-pollution control, enforcement, and information system, including interactive computer graphics as a method of output presentation. Two systems were interfaced--Michigan's Water Information System for Enforcement (WISE) and EPA's STORET system. The WISE system is used to alert enforcement personnel to problems through exception reporting, and to provide follow-up information on these problems. STORET is utilized as a storage and retrieval system for water quality and inventory information. As information enters WISE, certain inputs are coded for storage in STORET. The interface mechanism is a common numbering system. Because WISE is modular in design, it can be used in part or in total by other agencies. The demonstration indicated that careful consideration should be given to the information that will comprise the computer file. Administrative, procedural, and auditing techniques should be completely set down before proceeding with management's commitment to the system. Microfilm should be used when feasible, both as Computer Output Microfilm (COM) and in manual files. (EPA)
W74-00701

DEVELOPMENT OF A SELECTIVE ALGAECIDE TO CONTROL NUISANCE ALGAL GROWTH,
Dow Chemical Co., Freeport, Tex. Texas Div.
B. L. Prows, and W. F. McIlhenny.
Copy available from GPO Sup Doc as EP1.23; 660-73-006, $1.50; microfiche from NTIS as PB-225 027/2, $1.45. Environmental Protection Agency, Ecological Research Series, Report EPA-660/3-73-006, August 1973. 126 p, 27 fig, 28 tab, 45 ref. EPA Project 16010 EDJ, Contract 68-01-0076.

Descriptors: *Algicides, *Algal control, *Nuisance algae, *Cyanophyta, Assay, *Biocontrol, *Chem control, Phaeophyta, Organic compounds, Pesticides, Aquatic weed control.
Identifiers: Selective algicide, *Anabaena, *Microcystis, Analogs, Test compound, Phagocytic, Selective screening, Ochromonas.

The objective was to develop a compound which would effectively and economically control the growth of nuisance species of blue-green algae with a minimum impact on desirable forms of life in the aquatic environment. A computerized structure search of more than 100,000 compounds was made to select the analogs of the following four Phase I prime candidates: 2,5-Dichloro-3,4-dinitrothiophene; (5-Chloro-2- (p-nitrophenoxy)phenyl)phenyliodoniumchloride; 4-Amino-2,5-dibromophenylthiocyanate; and 1,1-Dimethyltetradecylamine, hydro-chloride. Through this endeavor 1309 compounds were selected, 41 of which emerged from a rapid, agar-plate screening as candidates for final laboratory screening tests. A golden-brown flagellate, Ochromonas ovalis, which exhibited phagocytic activity against the blue-green alga, Microcystis aeruginosa, was discovered during Phase I. Further research and development of biological-chemical control system included studies involving several species of Ochromonas and conditions which would enhance their phagocytic activity against Microcystis aeruginosa, with Ochromonas ovalis proving to be the most voracious feeder. (EPA)
W74-00702

INTERMEDIA ASPECTS OF AIR AND WATER POLLUTION CONTROL,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 05B.

W74-00703

QUALITY MANAGEMENT FOR WISCONSIN: A REPORT ON PRESERVING AND IMPROVING THE QUALITY OF THE AIR, LAND AND WATER RESOURCES.

National Resources Council of State Agencies, Madison, Wisconsin, March 1971. 118 p.

Descriptors: *Wisconsin, *Air pollution, *Land use, *Water resources, *Water quality, Governmental interrelations, Legislation, Environmental sanitation, Standards, Soil conservation, Monitoring, Solid wastes, Comprehensive planning, Municipal wastes, Taxes, Industrial wastes, Zoning, Waste disposal, Farm wastes, Litter, Flood plain zoning, Aesthetics, Mining, Forests, Optimum development plans, Parks, Highway beautification, Burning, Dredging, Inland waterways, Dams, Rivers, Groundwater, Recreation, Eutrophication, Thermal pollution, Pesticides.
Identifiers: Motor vehicle emissions, Industrial emissions, Highway littering, Billboards.

Functions of agencies delegated by Wisconsin Legislature to protect, develop, and manage Wisconsin air, land and water are reported. The State program--problems, laws, regulations, and present procedures are elucidated and those of counties and municipalities, all as affected by federal legislation. Regarding soil conservation, major accomplishments, soil surveys, budget, legal constraints, and present activities with future needs are discussed. Solid waste disposal problems in municipal, industrial, and private areas are presented. Although there are laws and regulations in relation to agricultural effects upon water pollution, greater involvement of local people is needed in identifying pollution sources and correcting problems. Examination of highway littering and floodplain-shoreland management prompts formulation of state policy on land development. Although ordinances are directed toward mining and subsequent land rehabilitation, a Mineral Conservation and Surface Mining Reclamation Act is being formulated. Aesthetic amenities--billboards, scenic easements, highway beautification, forest and park lands--are presented with recommendations. Surface and ground water quantity and quality, wild and scenic rivers, and public water supply were studied and recommendations given. Basic considerations involve need for an interagency coordinating council, a long-range comprehensive state water resources plan, interagency effort, and expansion of information systems. (Jones-Wisconsin)
W74-00715

THE EFFECTS OF STRIP MINING UPON NAVIGABLE WATERS AND THEIR TRIBUTARIES: DISCUSSION AND SELECTED BIBLIOGRAPHY.
Pittsburgh Univ., Pa. Graduate Center for Public Works Administration.
For primary bibliographic entry see Field 05C.
W74-00725

ENVIRONMENTAL CONTROL OF GAMETOGENESIS IN LAMINARIA SACCHARINA. II. CORRELATION OF NITRATE AND PHOSPHATE CONCENTRATIONS WITH GAMETOGENSIS AND SELECTED METABOLITES,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
For primary bibliographic entry see Field 05C.
W74-00726

PROTECTION OF WATER AGAINST POLLUTION,
For primary bibliographic entry see Field 05C.
W74-00731

STUDY OF THE EXTRACELLULAR POLYSACCHARIDES PRODUCED BY A BLUE--GREEN ALGA, A-37,
Mississippi State Univ., State College. Dept. of Microbiology.
W. S. Wang, and R. G. Tischer.
Archiv fur Mikrobiologie, Vol 91, No 1, p 77-81, 1973.

Descriptors: *Biochemistry, *Cyanophyta, Anabaena, Chromatography, Polymers, Carbohydrates.
Identifiers: *Anabaena flos-aquae, *Polysaccharides (Extracellular).

Separation of neutral and acidic polysaccharides from the heteropolymers produced by Anabaena flos-aquae A-37 is described and their monosaccharide composition elucidated. Molar ratio of the constituent monosaccharides of the polymers varies widely from species to species and variation even occurs within the same species under different conditions. Two types of polysaccharides were separated from the extracellular polysaccharide by ion exchange chromatography. The neutral polysaccharide is composed of mainly glucose with minor amounts of xylose in a molar ratio of 8:1. Glucose is believed to constitute the polysaccharide core to which xylose is attached. The acidic polysaccharide is composed of glucose and uronic acid as the major monomers with equal amounts of xylose and ribose as the minor constituents. The molar ratio of the monomers found in the acidic polymer is 6:1:1:10 as glucose:xylose:ribose:uronic acid. Chemical analyses showed that the extracellular polysaccharide consists of more neutral polymer (62%) than the acidic polymer (38%). The high proportion of glucose found in the neutral fraction suggests the major role of this monosaccharide acting as the core structure of the polymer. (Jones-Wisconsin)
W74-00734

MALEZAS ACUATICAS, AQUATIC WEEDS, J. M. BRISTOW,
Colombian Agricultural Inst., Bogota.
For primary bibliographic entry see Field 04A.
W74-00736

BODEGA: A CASE HISTORY OF INTENSE CONTROVERSY,
For primary bibliographic entry see Field 06G.
W74-00738

LAKE WASHINGTON,
For primary bibliographic entry see Field 05C.
W74-00739

PROTECTING OUR WATER ENVIRONMENT.
Denver Regional Council of Governments, Colo.

1973. 13 P, 1 APPEND.

Descriptors: *Water quality control, *Planning, *Sewerage, *Environmental effects, Water quality standards, Evaluation, Waste water disposal, Vegetation effects, Social aspects, Ecology.
Identifiers: *Denver (Colo).

Information is provided to the public on the Denver Water Quality Management Planning Program in preparation for 5 county public meetings. The Water Quality Program is concerned with the quality of the region's rivers and streams, the quality of the environment near these water resources, and wastewater disposal systems. The reasons for planning for water quality, criteria involved in designing wastewater disposal systems, the present system and alternative plans for improving the system, and an environmental evaluation of three of the alternatives are presented. Criteria discussed include environmental considerations such as geology, soils, vegetation, fauna, archaeology, and aesthetics, regulatory standards at both state and federal levels, and operational criteria involving economics and technology. The main alternatives considered involve the consolidation of the existing system of over 30 treatment plants to 3 or 4 large plants. One of the 4-plant alternatives was determined to have the least detrimental environmental effects. Recommendations to minimize detrimental impacts include the use of various environmental experts to survey proposed facility locations, the avoidance of certain land uses, vegetation types, and habitats, and the development of an overall environmental management plan for the region. (Elfers-North Carolina)
W74-00743

REPORT TO THE GOVERNOR AND THE LEGISLATIVE COMMISSION: POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY.
Las Vegas Valley Water District, Nev.
For primary bibliographic entry see Field 05D.
W74-00744

SEWER SYSTEM COST ESTIMATION MODEL.
Voorhees (Alan M.) and Associates, Inc., McLean, Va.
For primary bibliographic entry see Field 05D.
W74-00745

A REPORT UPON WEST CENTRAL MARICOPA COUNTY, ARIZONA: VOLUME I, A STUDY OF PHYSICAL ENVIRONMENTAL FACTORS AS A BASIS FOR LAND USE PLANNING.
Maricopa County Planning and Zoning Dept., Phoenix, Ariz.
For primary bibliographic entry see Field 03D.
W74-00746

THE ECONOMICS OF THE CATTLE FEEDING INDUSTRY IN ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06C.
W74-00758

SOME ASPECTS OF WEED CONTROL IN VINEYARDS, (IN ITALIAN),
A. Martinoli.
Not Mal Piante. 85 p, 111-130, 1971, Illus. (English summary).
Identifiers: Control, Drainage, *Herbicides, Mulch, Pyridyls, Rainfall, Soil, *Vineyards, *Weed control.

The concept of controlled weeding is discussed, including the products which can be used and the aspects which characterize the continual use of these desiccants. The spread and control of resistant weeds, the preparation of natural mulch with desiccated weeds, the stability of soil structure and the possibility of 'utilizing' the benefits of a weed cover during adverse weather conditions and alternating mowing with chemical desiccation are described. (Penetration of the rain in the soil is facilitated by the presence of a sod toether with better drainage during extensive periods of rainfalls.) A description is given of the functions and mechanism of action of special low pressure fan nozzles, used to reduce the danger of spray drift. The availability of a rapid acting desiccant capable of scorching the green parts of weeds in any phase of development and at any time of the year without the danger of phytotoxic accumulation in the soil, provides the prospects of new interesting techniques. Residual herbicides, at reduced doses, can thus be used with increased crop safety and the partially controlled weeds can be completely killed by the bipyridyls.--Copyright 1973, Biological Abstracts, Inc.
W74-00767

BANKS STUDY BASIN CLEANUP.
For primary bibliographic entry see Field 05D.
W74-00772

SAMPLING AND ANALYSIS OF CHEMICAL POLLUTANTS IN RIVER WATER,
Lee Conservancy Catchment Board (England).
For primary bibliographic entry see Field 05A.
W74-00773

CHEMICAL ANALYSIS OF WATER EFFLUENTS -- LESSONS FROM THE U.S. (ARMY CORPS OF ENGINEERS) PERMIT PROGRAM,
Institute of Paper Chemistry, Appleton, Wis. Div. of Natural Materials and Systems.
For primary bibliographic entry see Field 05A.
W74-00791

ENGINEERING REPORT ON SPECIAL ASSESSMENT STORM SEWER DISTRICT FOR THE NORTHEAST INDUSTRIAL DISTRICT, CITY OF KANSAS CITY, MISSOURI.
Riddle Engineering, Inc., Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W74-00802

PRELIMINARY STUDY FOR CENTRAL INDUSTRIAL DISTRICT SEWERS, DEPARTMENT OF PUBLIC WORKS, KANSAS CITY, MISSOURI.
Shafer, Kline and Warren, Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W74-00803

ENVIRONMENTAL HEALTH ANALYSIS.
Saginaw County Metropolitan Planning Commission, Mich.
For primary bibliographic entry see Field 05B.
W74-00808

CARGO SPILL PROBABILITY ANALYSIS FOR THE DEEP WATER PORT PROJECT,
Woodward-Lundgren and Associates, Oakland, Calif.
For primary bibliographic entry see Field 05B.
W74-00819

GAS REQUIREMENTS TO PRESSURIZE ABANDONED DEEP MINES,
NUS Corp., Pittsburgh, Pa. Cyrus Wm. Rice Div.
J. D. Robins.
Copy available from GPO Sup Doc as EP1.23:670-73-054, $2.00; microfiche from NTIS as PB-224 931/6, $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-054, August 1973. 192 p, 36 fig, 50 tab, 18 ref. EPA Project 14010 EFL.

Descriptors: *Mine drainage, *Water pollution control, Pyrite, Oxidation, *Pennsylvania, Acid mine water, Gases.
Identifiers: *Mine pressurization, *Leak detection, Oxygen free atmospheres, Ohiopyle State Park (Penn), Inert gas.

The objective was to determine the gas injection rates needed to develop and maintain slight pressures within a mine over ambient conditions during changes in the barometric pressure. The ultimate aim of the project was to determine the feasibility of blanketing an abandoned deep mine with an inert gas in order to eliminate the acid mine drainage. Pressurization tests were conducted at two typical abandoned deep mine sites in southwestern Pennsylvania. The study also included a state-of-the-art evaluation of existing technology which could be used to locate points of gas leakage from deep mines. The findings of this literature survey were implemented in several full-scale leak detection experiments. While pressurization tests conducted at the larger (50 acres) test mine site were generally inconclusive, the final test results obtained at the smaller (15 acres) mine site were encouraging. Slight positive differential mine pressure could be maintained over extended periods of time at air injection rates as low as 150 cfm. It was also found that barometric pressure fronts had little or no effect on differential mine pressures and that mine pressure differentials immediately dissipated at the cessation of air injection. The experimental data collected throughout this study is presented in the Appendix. (EPA)
W74-00836

SOME IMPORTANT PROBLEMS IN MODERN LIMNOLOGY (O NEKOTORYKH VAZHNYKH ZADACHAKH SOVREMENNOGO OZEROVEDENIYA),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
For primary bibliographic entry see Field 02H.
W74-00839

REGIONAL POLLUTION STUDY: INVENTORY AND ANALYSIS.
Tulsa City-County Health Dept., Okla. Environmental Health Div.
For primary bibliographic entry see Field 05B.
W74-00849

WALSH V. SPADACCIA (PROCEEDING TO SET ASIDE DETERMINATION OF TOWN BOARD APPROVING CONSTRUCTION PLANS WHICH DID NOT CONSIDER POLLUTION OF LAKE).
For primary bibliographic entry see Field 06E.
W74-00857

INCREASING PROTECTION FOR OUR WATERS, WETLANDS, AND SHORELINES: THE CORPS OF ENGINEERS.
For primary bibliographic entry see Field 06E.
W74-00858

THE DRAFT UNITED NATIONS CONVENTION ON THE INTERNATIONAL SEABED AREA--AMERICAN PETROLEUM INSTITUTE POSITION,
American Petroleum Inst., New York.
L. W. Finlay.
Natural Resources Law, Vol 4, p 73-83, January 1971. 4 ref.

Descriptors: *International laws, *United Nations, *Oil, *Mining, *Seabeds, Continental shelf, Legal aspects, Exploitation, Mineralogy, Governments, Legislation, Planning, Law of the sea, Water resources development.

The draft undertakes to establish a comprehensive petroleum and mining code for the entire seabed area of the high seas beyond the depth of 200 meters. A representative of the Petroleum Institute maintains that the draft convention is critically defective in its failure to provide adequate protection to United States off-shore mineral interests and that a further statement of presidential policy for the transitional period is urgently needed. Moreover, with appropriate administrative action, existing legislation is sufficient to encourage increased efforts in the recovery of seabed resources. Because of the killing effects of the proposed renunciation of all rights of the U.S. to natural resources of the continental margin beyond the 200-meter isobath, the problem cannot be solved by minor changes in the draft. (Mockler-Florida)
W74-00859

A BILL TO PROVIDE FOR THE ESTABLISHMENT OF THE POTOMAC BASIN NATIONAL RIVERWAYS.
For primary bibliographic entry see Field 06E.
W74-00864

COMMONWEALTH V. BARNES AND TUCKER COMPANY (SUIT FOR MANDATORY INJUNCTION REQUIRING DEFENDANT TO TREAT ACID MINE DRAINAGE FROM MINE).
For primary bibliographic entry see Field 06E.
W74-00866

ARE OCEAN POLLUTERS SUBJECT TO UNIVERSAL JURISDICTION--CANADA BREAKS THE ICE,
J. C. Klotz.
International Law, Vol 6, No 4, p 706-717, October 1972. 58 ref.

Descriptors: *Canada, *International law, *Law of the sea, *Pollution abatement, *Conservation, *Arctic Ocean, Resources, Legal aspects, Oil spills, Jurisdiction, Governments, Regulation, Damages, Ecosystems, Ecology, Administration, Legislation, Interest.
Identifiers: *Coastal waters, *Territorial waters.

The legality on the international level of Canada's Artic Waters Pollution Prevention Act is discussed. By this Act Canada asserts jurisdiction over activities in its Artic waters through a national regime governing everything from penalties for polluters to the construction of ships of any nation traversing the international waters of the Canadian Arctic. The Act defines 'Arctic waters' as all those waters above latitude 60 north within 100 miles of shore plus continental shelves or other substrata that Canada has the right to exploit. The legality of Canada's action is evaluated by comparing it with customary jurisdiction over ocean waters exercised by nation states. The areas of comparison are: (1) territorial principle--territorial sea and contiguous zones, (2) protected interest principle--extraterritorial effect of laws to conduct affecting security, (3) nationality of the offender, (4) nationality of victim, (5) universality principle--protect universal interests and punish offenses against the law of nations. The legislation is a valid excuse to protect universal interests, but the necessity of international regulation to protect ocean resources is stressed. (Napolitano-Florida)
W74-00867

NATURAL RESOURCES DEFENSE COUNCIL INC. V. GRANT (ACTION TO PERMANENTLY ENJOIN CONSTRUCTION OF WATERSHED PROJECT).
For primary bibliographic entry see Field 06E.
W74-00868

EFFLUENT NEIGHBORS: THE MEXICO--UNITED STATES WATER QUALITY DILEMMA,
C. R. Johnston, Jr.
California Western International Law Journal, Vol 3, No 1, p 152-173, December 1972. 114 ref.

Descriptors: *Water pollution, *International law, *Drainage basins, Water quality standards, Legal aspects, Governments, Legislation, Governmental interrelations, Water resources development, Federal government, Rio Grande River, Colorado River, United States, Mexico.

Water pollution problems shared by the United States and Mexico as a result of sharing three international drainage basins: the Rio Grande, Colorado and Tijuana river systems are discussed. Recognizing the contemporary problems international water quality control, the concepts and principles of international law which apply to drainage basins are described. The provisions that the United States and Mexico have made concerning water quality control of the subject drainage basins are discussed. A proposed solution to the Mexican-United States water quality dilemma is submitted. The American and Mexican govern-

ments must officially recognize the geographic unity of an international drainage basin and the application to such basins of the principle of equitable utilization in order to solve their present international water quality dilemma. Basin agencies would then provide for the realistic control of international drainage basin water quality. (Mockler-Florida)
W74-00869

WATER POLLUTION--USER OF CITY SEWER SYSTEM CREATES NUISANCE AGAINST LOWER RIPARIAN,
J. E. Crowe, Jr.
Missouri Law Review, Vol 38, p 161-170, Winter 1973. 59 ref.

Descriptors: *Arkansas, *Missouri, *Riparian rights, *Sewage disposal, *Water pollution control, Damages, Reasonable use, Public utilities, Contracts, Benefits, Third party effects, Waste disposal, pollution abatement, Legal aspects, Judicial decisions.
Identifiers: *Hazardous substances (Pollution), *Nuisance (Legal aspects).

Possible liability of the users of a city sewer system to a lower riparian in an action based upon nuisance is discussed. Plaintiff-appellant sought damages as lower riparian against defendent-appellee for discharging certain noxious wastes into the city sewer system thereby overloading the sewage treatment plant and polluting a creek to plaintiff's detriment. Plaintiff alleged defendent was under a contract with the city to eliminate from its deposits into the sewer system 'all offensive and noxious waste products' and further alleged that the purpose of the contract was to prevent overloading the system and, in turn, harm to riparian downstream from the sewage facility. The state supreme court reversed holding that a party who owes no obligation to third persons or the public in general may contract to assume an obligation to use due care toward such third persons or the public in general. Rights of lower riparians based upon nuisance and reasonable use theory, liability for pollution caused by discharge into a municipal water system, control of discharge, and possible applications of the subject case in other situations are discussed. (Napolitano-Florida)
W74-00870

REPORT OF PROCEEDINGS AT PUBLIC HEARING RELATING TO AN APPLICATION FILED BY AROUSED RESIDENTS OF CROWDERS CREEK INC. REQUESTING RECLASSIFICATION OF CROWDERS CREEK, CATAWBA RIVER BASIN, CLEVELAND AND GASTON COUNTIES .

Water and Air Quality Control Committee, North Carolina Board of Water and Air Resources, Raleigh, May 19, 1972. 63 p.

Descriptors: *North Carolina, *Legislation, *Water quality standards, *Recreation, Water pollution sources, Industrial wastes, Sewage administration, Water pollution control, Water law, Commissions, Impaired water quality, Municipal wastes, Public health.

The application requested reclassification of Crowders Creek so that it may be protected as suitable for water-body contact recreation. The petition for reclassification emphasized that the stream and its tributaries are presently used and have been used by at least two municipalities and no fewer than nine North Carolina businesses and industries as an outlet and outfall sewer for municipalities and industrial wastes. Moreover, on numerous occasions, overflow of municipal raw sewages and deliberately dumped raw industrial wastes, both organic and inorganic, have taken place to the detriment of the stream and to the untold damage of the lower riparian owners and users. (Mockler-Florida)
W74-00871

RESTORE RURAL WATER AND WASTE DISPOSAL GRANT PROGRAMS.
Hearings--Comm. on Agriculture, U.S. House of Representatives, 93rd Cong, 1st Sess, February 19-20, 1973. 54 p.

Descriptors: *Legislation, *Water quality standards, *Sewage treatment, *United States, Governments, Waste treatment, Environmental sanitation, Public health, Sewage effluents, Water treatment, Water pollution sources, Sewage, Sewage systems, Grants.
Identifiers: *Congressional hearings, *Consolidated Farm and Rural Development Act.

These hearings concerned the bill to restore the rural water and sewer grant program under the Consolidated Farm and Rural Development Act. Testimony at the hearings indicated that there is no other federal program which small villages and towns can turn to for grant assistance in bridging the sizable gap between what is required by way of water treatment facilities and what is fiscally practical. The program is needed to enhance the quality of rural America's natural environment and safeguard the health and physical well-being of the millions of U.S. citizens residing in small rural communities. Most rural communities cannot carry the bonded indebtedness for the whole cost of the needed water and sewer systems, and, as a result, representatives of many towns appeared to give testimony at the hearings on this proposed legislation. In the past, this program has materially contributed to the construction of about 6500 rural water and sewage treatment plants. The testimony indicated that it would be unwise, unrealistic, and unfair to terminate the Rural Water and Sewer Grant Program. (Mockler-Florida)
W74-00875

LOST CREEK WATERSHED, NEWTON COUNTY, MISSOURI (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-00880

GILLHAM LAKE, COSSATOT RIVER ARKANSAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 04A.
W74-00881

GILLHAM LAKE, COSSATOT RIVER, ARKANSAS, APPENDIX II (PHOTOGRAPHS), APPENDIX III (ENVIRONMENTAL ELEMENTS), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 04A.
W74-00882

OPTIMAL ALLOCATION OF ARTIFICIAL AERATION ALONG A POLLUTED STREAM USING DYNAMIC PROGRAMMING,
California Univ., Los Angeles. Dept. of Engineering Systems.
S. Chang, and W. W-G. Yeh.
Water Resources Bulletin, American Water Resources Association, Vol 9, No 5, p 985-997, October 1973. 3 fig, 9 ref.

Descriptors: *Water quality control, *Stream improvement, *Dissolved oxygen, *Dynamic programming, Algorithms, Optimization, Resource allocation, Mathematical models, Systems analysis, Costs, Numerical analysis.
Identifiers: *Artificial aeration, *Cost minimization, Mass balance equation, Langrange multiplier.

When a series of aerators are used to raise the level of dissolved oxygen in a polluted stream through instream artificial aeration augmentation, the system is governed by the basic dissolved oxygen mass balance equation with the existence of artificial aeration as its boundary conditions. A mathematical model is developed for the optimization of the allocation of aeration capacity to each of the series of aerators subject to a limitation on total available aeration capacity. The objective function is to minimize the sum of the squares of the aeration costs and the costs incurred by damaging or unnecessarily improving the system. The original constrained allocation problem is simplified by converting it to an unconstrained one via use of Lagrange multipliers. A discretized dynamic programming algorithm is formulated for finding the optimal allocation policy. A typical optimal aeration capacity allocation policy and its corresponding dissolved oxygen sag profile for the illustrated numerical example is presented, and the relationship between the total available aeration capacity and Lagrange multiplier is also developed treating weighting factors as parameters. (Bell-Cornell)
W74-00883

NONLINEAR EFFLUENT CHARGES,
California Univ., Riverside.
T. A. Ferrar.
Journal of the Institute of Management Science: Application, Vol 20, No 2, p 169-178, October 1973. 3 fig, 14 ref.

Descriptors: *Regions, Effluents, *Taxes, *Pollution abatement, *Standards, Resource allocation, Information, Water pollution control, Costs, Constraints, Algorithms, Mathematical models, Systems analysis, *Pollution taxes (Charges).
Identifiers: *Environmental quality, Incentive-feedback algorithm, Cost minimization.

An effluent taxation structure for meeting a specified standard of regional environmental quality is derived. The significant operational weakness of the effluent charge technique in environmental management is its fundamentally static applicability. A nonlinear effluent taxation policy is developed which will alleviate this weakness. It is demonstrated that the nonlinearity of the proposed charge scheme displays equilibrium results identical to linear user-charge programs but elicits superior dynamic characteristics. Moreover, through use of an iterative stimulus-response algorithm, the technical information transfer among sectors is minimized by mapping response surfaces for polluter behavior. These continuously updated response patterns are then used to guide the system to a social optimum. The allocation procedure involves an incentive-feedback algorithm that iteratively rations the available environmental resource among the polluters in accordance with a cost-minimization objective. The progressive taxation program developed induces polluters to modify their effluent discharge levels in accordance with an environmental control board's specifications while insuring that these specified levels are not violated. Recognizing the stochastic nature of the optimal allocation of environmental resources and the need to reckon the existence of adjustment lags within any operational context, it is argued that meaningful policing of environmental quality will require the nonlinear taxation approach. (Bell-Cornell)
W74-00886

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME II.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00889

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME I.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00890

CORROSION CONTROL IN LARGE VOLUME PUMPING BRINE WELLS,
Oilwell Research, Inc., Long Beach, Calif.
For primary bibliographic entry see Field 08G.
W74-00937

GROUND WATER POLLUTION AND CONSERVATION,
For primary bibliographic entry see Field 04B.
W74-00938

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT SULFATE-REDUCING BACTERIA (BUT WERE AFRAID TO ASK),
For primary bibliographic entry see Field 05B.
W74-00942

CORROSION AND INCRUSTATION - GUIDELINES FOR WATER WELLS,
Universal Oil Products. St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 08G.
W74-00948

WELL CONSTRUCTION HELPS DETERMINE WATER QUALITY,
Agricultural Research Service, Beltsville, Md. Farmstead Water Systems Research.
For primary bibliographic entry see Field 05B.
W74-00954

METHOD AND MEANS FOR ABSORBING CRUDE OIL AND THE LIKE FOR TRANSPORTATION AND RECOVERY,
Grantley Co., Jefferson, Ohio. (Assignee)
J. Weinberg.
U.S. Patent No. 3,756,948, 3p, 6 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 281, September 4, 1973.

Descriptors: *Patents, *Oil spills, Water pollution sources, Treatment, *Absorption, Plastics, *Pollution abatement, Water pollution control.
Identifiers: Polystyrene.

The material used is a foamed polystyrene plastic which is of closed cell-type, made by inflating cells of polystyrene with aire. The foam has a density between 1.4 and about 2.0 pounds per cubic foot and an average cell size between about 1.0 mm and 3.0 mm, and absorbs about nineteen times it weight of crude oil. It has a selective absorption for oil when subjected to a mix of oil plus water, and does not soil upon contact after absorbing a saturated load of crude oil out of a bath of water. The absorbent foam is prepared by shredding to open up the cells for better oil absorption. Crumbs of the foam are spread upon the oil layer where they become saturated with about nineteen times their own weight in crude oil within about one minute. In addition to being used for cleaning up oil spills on a body of water, it might be used to clean up a sandy beach polluted by crude oil, and to absorb crude oil at a well head leakage. (Sinha-OEIS)
W74-00959

OIL SKIMMER MODULE,
Crisafulli Pump Co., Inc., Glendive, Mont.
A. J. Crisafulli.
U.S. Patent No. 3,756,414, 3 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 155, September 4, 1973.

Descriptors: *Patents, *Oil spills, Water pollution sources, *Skimming, Water pollution control, *Pollution abatement.

The skimmer module is adapted to be mounted in front of a floating barge or other vessel for removing the surface layer from a body of water when the surface contains oil or other pollutants. The module has an open front receptacle with a horizontally inclined edge defining a weir that is able to be raised or lowered for varying the depth of the weir in relation to the surface of the body of water. Each module has a pump for removing water and pollutants collected in the receptacle and discharging them into a storage area. (Sinha-OEIS)
W74-00961

WATER DISPOSAL CAISSON AND METHOD OF USING SAME,
C. J. Carmichael, and A. G. Franklin.
U.S. Patent No. 3,756,409, 3 p, 11 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 154, September 4, 1973.

Descriptors: *Patents, *Oil pollution, Water pollution sources, *Waste water disposal, Separation techniques, Water pollution control, Pollution abatement.

An offshore water disposal caisson for separating oil from waste water comprises the following parts: An outer caisson with an open bottom for communicating with the body of water; an oil collection tube having a closed bottom and a side wall oil filling opening through which oil is introduced proximate its upper end, the tube being of a diameter less than that of the outer caisson within which it is set; a waste water introduction tube for introducing the waste water below the oil-water interface within the caisson; and a pump to pump oil from the collecting tube as it approaches the tube's total capacity. (Sinha-OEIS)
W74-00963

SELF-RIGHTING FLOATING BOOMS,
M. F. Smith, and A. V. Anusauckas.
U.S. Patent No. 3,756,031, 7 p, 13 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 58, September 4, 1973.

Descriptors: *Patents, *Oil spills, Water pollution sources, Floats, Equipment, *Pollution abatement, Water pollution control.
Identifiers: *Oil booms.

A self-righting floating boom is constructed by mounting on a vinyl fin several polymer floats. The polymer float is rectangular in shape with a shelf-like portion extending laterally from the flat side surface of the float and running the length of the float, with its ends being 'raked', to reduce drag during rapid endwise deployment. The shelf-like portion extends a distance at least equal to the float thickness and is positioned along the lower half of the float height. The bottom surface of the shelf-like extension of the float incorporates sloped surfaces along its terminating ends. This provides a lifting surface causing each float to skim or 'plane' on its shelf during end-wise deployment and eliminates any submergence tendency during endwise towing. (Sinha-OEIS)
W74-00965

APPARATUS AND METHOD FOR COLLECTION OF OIL FROM SURFACE OF THE SEA,
S. M. Verdin.
U.S. Patent No. 3,754,653, 4 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 913, No 4, p 1140, August 28, 1973.

Descriptors: *Patents, *Oil spills, Water pollution sources, Pollution, *Separation techniques, Equipment, *Pollution abatement.
Identifiers: *Oil scoops.

Oil is removed from the surface of water in the presence of waves by mechanically scooping in large quantities of oil-contaminated surface water. The oily water is guided directly to the separation tank. The oil-rich phase may be passed over a weir into a storage compartment before it is directed into a separation tank. The scoop is disposed in the sea with its sidewalls extending down into the water and projecting above the surface of the water. The correct elevation of the scoop structure relative to the sea is maintained by means of ballast tanks. (Sinha-OEIS)
W74-00968

HEALTH ASPECTS OF FISH PRODUCTS FROM POLLUTED WATER,
For primary bibliographic entry see Field 05C.
W74-00979

PRELIMINARY RESULTS OF THE PROJECT FOR CONTROLLING AND PREVENTING SCHISTOSOMIASIS IN THE LOWER MANGOKY (MALAGASY REPUBLIC),
Institut Tropical Suisse, Basel.
For primary bibliographic entry see Field 05F.
W74-00992

EFFECT OF FISH ON THE BOTTOM OF RESERVOIRS,
For primary bibliographic entry see Field 02H.
W74-01020

LOUISIANA GOVERNMENT AND THE COASTAL ZONE-1972.
For primary bibliographic entry see Field 06E.
W74-01028

(THE POTOMAC 1972).
Interstate Commission on the Potomac River Basin, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-01032

WETLANDS '73: TOWARD COASTAL ZONE MANAGEMENT IN LOUISIANA.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.
For primary bibliographic entry see Field 02L.
W74-01043

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

A METHODOLOGY FOR ASSESSMENT OF WATER RESOURCES DEVELOPMENT: A COMPETITIVE EVALUATION MODEL FOR WATER RESOURCES DEVELOPMENT PLANNING,
Oklahoma Univ., Norman. Bureau of Water Resources Research.
For primary bibliographic entry see Field 06B.
W74-00559

DEVELOPMENT OF A DYNAMIC WATER MANAGEMENT POLICY FOR TEXAS,
Texas A and M Univ., College Station. Water Resources Inst.
W. L. Meier, J. C. Helm, and G. L. Curry.
Available from the National Technical Information Service as PB-224 844, $5.50 in paper copy, $1.45 in microfiche. Completion Report No. 52, June 1973. 215 p, 8 fig, 13 tab, 99 ref, 2 append.

Descriptors: Water resources, *Long-term planning, Reservoir operation, *Multiple-purpose reservoirs, *Linear programming, *Stochastic

processes, Model studies, *Storage capacity, Expansion, Optimization, Evaluation, Construction, Timing, Scheduling, Water management (Applied), Project planning, Systems analysis, *Texas.
Identifiers: *Cost minimization, Operating policy, Change constraints, Integer programming, Bender's decomposition technique, Continuity equation, Hydrologic uncertainty, Economic uncertainty.

Optimization techniques are developed to assist in the implementation of long-range water resource plans. A stochastic programming formulation for obtaining an operating policy for single, multi-purpose reservoirs based on the continuity equation, stochastic inflow and demand, and chance constraints is developed. The chance constraints are converted to an equivalent linear deterministic set of contraints by a material balance equation. The formulation is then extended to a linked, multiple-purpose reservoir system. Both linear and quadratic objective functions are used with the equivalent linear constraint set. The problem addressed is to select reservoir storage capacities, schedule construction timing, and establish an operating policy which minimizes the total cost of a linked system of multi-purpose reservoirs. This mixed integer-continuous linear programming problem is separated into a linear programming problem and an integer programming problem using Bender's decomposition technique. The methodology is applied to Cypress Creek Basin in northeastern Texas. (Bell-Cornell)
W74-00562

ALGORITHM FOR SOLVING A CLASS OF LINEAR PROGRAMMING PROBLEMS RELATED TO RESERVOIR MANAGEMENT AND DESIGN,
Universidad Nacional del Sur, Bahia Blanca (Argentina).
For primary bibliographic entry see Field 04A.
W74-00667

OPTIMIZATION MODEL FOR THE OPERATION OF FLOOD CONTROL SYSTEMS,
Natal Univ., Durban (South Africa). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W74-00668

WHEAT RESPONSE TO SOIL MOISTURE AND THE OPTIMAL IRRIGATION POLICY UNDER CONDITIONS OF UNSTABLE RAINFALL,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 03F.
W74-00669

LEAST-COST ALLOCATION AND VALUATION MODEL FOR WATER RESOURCES,
city Univ. of New York. Dept. of Mathematics.
For primary bibliographic entry see Field 05D.
W74-00670

PATHOLOGY OF A DYNAMIC PROGRAMING SEQUENCING ALGORITHM,
Northwestern Univ., Evanston, Ill. Dept. of Industrial Engineering and Management Sciences.
T. L. Morin.
Water Resources Research, Vol 9, No 5, p 1178-1185, October 1973. 1 fig, 3 tab, 16 ref.

Descriptors: *Dynamic programming, *Algorithms, *Sequencing, Water resources development, Capital, Investment, Planning, Mathematical models, Systems analysis.
Identifiers: *Nonoptimality, *Capacity expansion, *Imbedded state space approach.

Two cases in which a conventional dynamic programming algorithm may produce nonoptimal solutions to an important class of sequencing problems encountered in water resources development are identified. The pathological behavior of the conventional dynamic programming algorithm is analyzed and illustrated with a counterexample. The use of the imbedded state space approach in the determination of optimal solutions in the two cases is discussed and illustrated by solution of the counterexample. Extension of the imbedded state approach to the solution of more general selection and scheduling problems is also discussed. In the case of capacity expansion sequencing and scheduling, seemingly straightforward applications of dynamic programming fail because they overlook the combinatorial nature of such problems. The imbedded state space approach actually exploits the combinatorial nature of the expansion problems, thus guaranteeing that the optimal solution will always be found. (Bell-Cornell)
W74-00671

CAPACITY DECISIONS IN A MULTIPURPOSE MULTIRESERVOIR SYSTEM,
Montana State Univ., Bozeman. Dept. of Industrial and Management Engineering.
For primary bibliographic entry see Field 04A.
W74-00672

DETERMINATION OF THE DISCHARGE POLICY FOR EXISTING RESERVOIR NETWORKS UNDER DIFFERING OBJECTIVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W74-00673

MARKET PROBLEMS IN THE DISTRIBUTION OF EMISSION RIGHTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 05G.
W74-00674

AN EVALUATION OF THE WATER-RELATED ECONOMIC RESOURCE DEVELOPMENT OF APPALACHIA-IN-MISSISSIPPI,
Mississippi Research and Development Center, Jackson.
T. A. Herrin.
Tombigbee River Valley Water Management District, Tupelo, Mississippi, December, 1967. 234 p, 22 fig, 76 tab, 3 append.

Descriptors: *Water resources development, *Regional development, *Economic impact, *Comprehensive planning, Mississippi, Appalachian Mountain Region, Costs, Benefits, Wages, Regional economics.
Identifiers: *Tennessee - Tombigbee Waterway.

The proposed development of the Tennessee-Tombigbee Waterway is expected to have a major influence on the economic development of the 20-country Appalachia area in northeastern Mississippi. This area, like all other Appalachia areas, lags the nation in economic development and in educational and health facilities. Recognizing this and to promote economic development, the U.S. Congress direcred the Secretary of the Army to prepare a comprehensive plan for the development and efficient utilization of water resources in Applachia. This study evaluates the economic framework of the Mississippi Appalachia area and estimates the impact of the proposed Tennessee-Tombigbee Waterway project on the area's economy. In 1960, the area's population was 406,187. It is estimated to grow to 1,392,000 by 2020, based on employment expansion from 134,040 to 500,000. Per-capita income is expected to rise from $940 to 6,310. The Tennessee-Tombigbee Waterway project is estimated to cost $325 million, with an annual cost of $16.9 million over a 50-year life. Annual benefits are estimated to average $521 million of which $496 million is attributed to payroll benefits resulting from economic growth. (Poertner)
W74-00799

RECREATION/TOURISM DEVELOPMENT PROGRAM FOR THE MISSISSIPPI APPALACHIAN AREA.
Noblin Research, Jackson, Miss.

Mississippi Research and Development Center, Jackson, Mississippi, June, 1970. 113 p, 12 fig, 8 tab.

Descriptors: *Water resources development, *Regional development, *Recreation demand, *Economic impact, *Appalachian mountain region, Mississippi, Comprehensive planning, Tourism, Recreation facilities, Economics.

The economic development of the Tombigbee River Valley Water Management District is dependent on the development of recreational facilities and water resources. The development of water resources will stimulate the development of recreation and tourism in the area. This study was undertaken to identify existing recreational facilities and suggest future facilities for fulfilling the recreational needs of area residents and tourists. The area involved is in the northeastern section of Mississippi and includes 20 countries. The area falls under the jurisdiction of the federal Appalachian Regional Development Act, which directs the Secretary of the Army to prepare a comprehensive plan for the development and efficient utilization of water and related resources of the area for improving the economic conditions. A program for the development of recreational facilities and tourist attractions was estimated to cost $206.1 million in new capital investment. Income generated would be $442.6 million and 17700 jobs would be created. It was suggested that historic sites be developed as well as a major attraction comparable to Disneyland. (Poertner)
W74-00800

OPEN SPACE AND RECREATION PLAN.
Coastal Area Planning and Development Commission, Brunswick, Ga.

Prepared for the Department of Industry and Trade, Atlanta, Georgia, May, 1973. 119 p, 13 fig, 12 tab, 7 ref. HUD CPA-GA-04-04-1002.

Descriptors: *Water resources development, *Comprehensive planning, *Recreation demand, *Recreation facilities, Georgia, Data collections, Water sports, Water resources, Natural resources, Water resources development.

Open space and recreational facilities were studied as part of a comprehensive development plan. The area involved includes 8 countries in southeastern Georgia, bordered by Florida to the south and South Carolina to the north. It is predominately rural and comprises a total area of 3,775 square miles and a population of about 300,000. The region has a diversified industrial base and many natural resources including an abundance of wildlife, a variety of vegetation and many rivers and marshlands. The existing features of the area are inventoried in this study and projected needs are estimated for the period 1973 to 1991. During these years, the population is expected to double and provision for facility use by persons outside the area must be taken into consideration. The area has many attractions of historic interest. It is recommended that: local governments set aside a minimum of 10 acres of open space and recreational land per 1000 people, that professional recreation-management personnel be hired in each country, and that private enterprise be encouraged to supply recreational facilities. (Poertner)
W74-00801

PROGRESS REPORT ON THE PROPOSED YELLOW CREEK PORT PROJECT TISHOMINGO COUNTY, MISSISSIPPI.
Tombigbee River Valley Water Management District, Tupelo, Miss.

January 23, 1969. 98 p, 3 fig, 4 tab.

Descriptors: *Regional development, *Water resources development, *Harbors, *Economic feasibility, Economic impact, Economics, Mississippi, Regional economics, Planning, Transporation, Ships.
Identifiers: *Yellow Creek (Mississippi).

A port in the northeast corner of the State of Mississippi would greatly improve economic conditions and has been a topic of discussion for many years. A feasibility study completed in 1967 showed that 13 countries would benefit from port development on Yellow Creek in Tishomingo County. It is estimated that direct benefits to existing firms would be about $1.4 million over the life of the port. In addition, new firms would be attracted to the area, providing new jobs and an increased tax base also, freight rates for rail transportation would probably decrease from the competition between railroads and water transport companies. Total benefits are estimated at over $44.6 million, with a project benefit-cost ratio of 6.07. Because of the attractiveness of this project, local legislators encouraged state-enabling legislation, which was adopted. The legislation established the governing structure for the project. Several counties fulfilled these requirements and the project has progressed closer to reality, although action has not progressed beyond the planning stage. (Poertner)
W74-00804

COMPREHENSIVE WATER AND SEWERAGE PLAN FOR OUACHITA PARISH.
Sample, Jenkins and Madden, Monroe, La.

The Ouachita Council of Governments, Monroe, Louisiana, 1973. 76 p, 5 fig, 14 tab, 13 ref. HUD LAO6-48-1010.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, Storm drains, Louisiana, Water resources development, Costs, Construction costs, Planning, Data collections, Waste water treatment.
Identifiers: *Ouachita Parish (Louisiana).

A comprehensive plan for water and sewerage was prepared for the Ouachita Parish, Louisiana. Existing water, sewer and storm drainage systems were inventoried. Design criteria were described, and a plan was established for improvement of the existing system. Seventy-two public water systems (each serving more than 10 people) were campgrounds, etc. These systems pose problems of monitoring of health standards. Water is taken from both ground and surface supplies, and all but one system violates one or more Public Health Service standards (usually color). Sewage treatment is often accomplished with the use of oxidation ponds, a favorable arrangement where land is inexpensive. There are many small systems which pose monitoring problems for the health department. The major system in the City of Monroe is also threatened by structural failure of a sewer main, plant overloads, odors, and corrosive action by hydrogen sulfide. Storm drainage appears to be adequate in the parish. In some areas, open channels are used and periodic cleaning is required to maintain the channel capacity. Based on an increase in population from 97,500 in 1970 to an ultimate population of 250,925, detailed projects are cost-estimated with a list of 18 priority projects. (Poertner)
W74-00806

ADDITIONAL SOURCES FOR WATER SUPPLY FOR THE TOWN OF WELLESLEY.
Coffin and Richardson, Inc., Boston, Mass.

Board of Public Works, Wellesley, Massachusetts, October 18, 1966. 31 p, 2 fig, 3 tab, 3 append.

Descriptors: *Water resources development, *Forecasting, *Planning, *Water demand, Water supply, Massachusetts, Water requirements, Dependable supply, Water shortage, Imported water, Political aspects, Institutions, Urbanization, Water contracts.
Identifiers: *Wellesley (Massachusetts), *Boston (Massachusetts).

The Town of Wellesley, Massachusetts, located within 10 miles of Boston, is faced with an impending water shortage. The town had a 1966 population of about 27,000 and is expected to grow to a population equivalent of about 36,600 by the year 2000. Water consumption per person is also expected to increase, and total water consumption is expected to increase from the 1965 level of 3.10 mgd average (7.64 mgd maximum) to about 5.9 mgd average (18.0 mgd maximum) in year 2000. Six wells, that serve the town have a combined available water quantity of less than 7.7 mgd for extended periods of time. Alternatives include joining the Metropolitan District Commission (MDC) of Boston and developing additional groundwater supplies. Joining the MDC would require the expenditure of from $1.19 to $1.34 million and the purchase of land and rights-of-way. The Town of Wellesley would also be obligated to purchase a minimum of one-third of their water from the MDC at the rate of $120 per million gallons. Groundwater supplies furnishing 10 mgd could be developed for a total of $737,000 excluding land and rights-of-way. One problem which must be settled is a state law which prevents any town within a 10-mile radius of the State House (which includes Wallesley) from developing new supplies--they are obligated to join the MDC. It is debatable whether this water source is a new supply or part of the supply already tapped by other wells. (Poertner)
W74-00807

FINDINGS OF THE NATIONAL WATER COMMISSION,
National Water Commission, Arlington, Va.
T. M. Schad.
Paper presented at the American Society of Civil Engineers, National Water Resources Engineering Conference, Washington, D. C., January 29-February 2, 1973. 11 p.

Descriptors: *Comprehensive planning, *Water requirements, *National Water Commission, *Water resources development, Forecasting, Planning, Water allocation (Policy), United States, Alternative planning.

The National Water Commission recently completed an 1100-page report including many recommendations for future water development in the United States. Two general recommendations are: (1) that the country should plan for future water use in terms of alternative futures rather than to project past trends indefinitely into the future, and (2) that the nation's water institutions are recognized to be experiencing a 'cultural lag' in that past programs have not been evaluated in terms of present requirements, but have been followed blindly. A major recommendation is that the beneficiaries of water resource development, and not the general taxpayer, pay the cost of such development. Water planning should not be an end in itself. It should be an adjunct to land use planning. Water quality planning must go hand-in-hand with water quantity planning. Over 208 specific recommendations were presented in the report. (Poertner)
W74-00812

PHASE I COMPREHENSIVE WATER AND SEWER PLAN.
Mid-Missouri Regional Planning Commission, Jefferson City.

September, 1971. 114 p, 18 fig, 43 tab.

Descriptors: *Comprehensive planning, *Data collections, *Natural resources, Missouri, Evaluation, Agriculture, Water resources, Population, Facilities.

The development of a comprehensive water and sewer plan for the Mid-Missouri Regional Planning Commission requires that an inventory of existing conditions first be prepared. The region includes 8 counties with a 1970 population of about 225,000 which is expected to grow to about 279,000 by 1990. The area has been--and will continue for some time to be - agricultural in nature. However, farm employment and population has declined sharply as the result of farm consolidation and mechanization. Average family income is $4,304 compared to the St. Louis average of $7,527. A complete inventory was made of the following: (1) economic conditions; (2) natural resources, including minerals, timber, agriculture, water, and soil type; and (3) community and transportation facilities. The area relies on both groundwater and surface water and both seem to be in good supply. Communities most often rely on groundwater for municipal supplies. Only 6 communities rely on surface water from the Missouri River or other impoundments. Groundwater is generally hard. (Poertner)
W74-00813

OPTIMAL ALLOCATION OF ARTIFICIAL AERATION ALONG A POLLUTED STREAM USING DYNAMIC PROGRAMMING,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 05G.
W74-00883

SUBJECTIVE DECISION-MAKING FOR URBAN WATER RESOURCES DEVELOPMENT,
Rockwell International Corp., Anaheim, Calif.
For primary bibliographic entry see Field 06B.
W74-00884

SCIENTIFIC ALLOCATION OF WATER RESOURCES, WATER RESOURCES DEVELOPMENT AND UTILIZATION - A RATIONAL APPROACH,
Technion - Israel Inst. of Tech., Haifa. Lowdermilk Faculty of Agricultural Engineering.
N. Buras.
Environmental Sciences Series, American Elsevier Publishing Company, Inc., New York, N.Y. 1972. Asit K. Biswas, Editor. 197 p, 38 fig, 2 tab, 260 ref.

Descriptors: Water resources, Engineering, *Water quality, *Water quantity, *Dynamic programming, *Linear programming, *Simulation analysis, *Stochastic processes, Optimization, Water utilization, Design, Operation and maintenance, Water resources development, Operations research, Mathematical models, *Water allocation (Policy).

The state-of-the-art of water resources engineering is surveyed, embracing a broad spectrum of issues: quantity aspects as well as quality aspects within a systems approach. The field of water resources engineering is defined, emphasizing its natural and social sciences components. The systems approach to water resources problems is described and illustrated in the context of the design and operation of water systems. Then, three broad categories of water engineering are identified and discussed: Development, design, and operation problems. The remainder, and

greater part, of the book explores operations research methods used in solving such problems. Discussed are: (1) probability techniques and their application to water storage problems; (2) linear programming applications to water quality management, reservoir operation and design, and aquifer management; (3) basic ideas of dynamic programming, the method best suited to sequential decision processes; (4) applications of dynamic programming to derive optimal operating procedures for a variety of systems, from relatively simple ones to complex systems involving multiple purposes, many structures, and surface and ground water; and finally (5) simulation techniques, including the methods of synthetic hydrology and Monte Carlo. (Bell-Cornell)
W74-00885

NONLINEAR EFFLUENT CHARGES,
California Univ., Riverside.
For primary bibliographic entry see Field 05G.
W74-00886

SYSTEMS ENGINEERING APPROACH,
Texas Water Development Board, Austin. Systems Engineering Div.
A. O. Weiss.
Water for Texas, Vol 2, No 1, p 3-9, October, 1971. 5 fig.

Descriptors: *Mathematical models, *Analytical techniques, *Computer models, Computers, Model studies, Research and development, Technology, *Synthetic hydrology, *Water management (Applied), Routing, Water resources, Water supply.
Identifiers: Hydrologic analysis, *Systems engineering.

The Systems Engineering Approach is more than a set of computerized modeling capabilities. It is a philosophy of analysis and problem solving which with the aid of computers evaluates complex systems. The Systems Engineering Approach can be used to help planners in their effort to consider the myriad hydrological, physical, economic, environmental and social aspects involved in water resources development in a comprehensive and systematic manner. The systems modeling capabilities are not designed to provide a detailed quantitative solution to every problem, nor do they represent an exact simulation of the prototype. They represent a set of mathematical techniques that approximate the prototype at various degrees of fidelity and provide information at varying levels of accuracy, in a manner helpful to the evaluation of and selection between viable alternatives. Equipment models used by the Texas Water Development Board in its regional water resources management programs are discussed. (Hunt-NWWA)
W74-00940

OPTIMIZATION OF SURFACE-WATER QUALITY: A PROPOSAL FOR SOLVING A FUTURE PROBLEM (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene-Institut.
For primary bibliographic entry see Field 05B.
W74-00994

IN SEARCH OF NEW METHODS FOR RIVER SYSTEM PLANNING,
Harvard Univ., Cambridge, Mass. Graduate School of Public Administration.
For primary bibliographic entry see Field 04A.
W74-01029

THE HARVARD PROGRAM: A SUMMING UP,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 06B.
W74-01030

6B. Evaluation Process

WILD RIVER PECEPTION AND MANAGEMENT: A STUDY OF USERS AND MANAGERS OF THE MIDDLE FORK OF THE SALMON RIVER,
Idaho Univ., Moscow. Dept. of Agricultural and Forest Economics.
R. L. Peckfelder.
Available from the National Technical Information Service as PB-224 832, $4.25 in paper copy, $1.45 in microfiche. M.S. Thesis in Forest Recreation, Idaho Water Resources Research Institute, Moscow, Scenic Rivers Study, N.Y. August 1973. 108 p, 1 fig, 37 tab, 24 ref, append. OWRR C-3342-(3718) (2).

Descriptors: *Idaho, *Forest management, *Wild rivers, *Attitudes, Water users, *Census, *Recreation, Fishing.
Identifiers: *Salmon River (Idaho).

Evidence indicates that foresters who manage the Middle Fork of the Salmon River are very much in tune with floaters in their personal outlook on river management; they correctly predicted user reaction to more than therefourth of the questionnaire statements presented in this study. Questionnairs from 253 of 367 floaters and all Forest Service personnel were returned. Eighty percent of the statements were correctly perceived by managers. Forest Service personnel, however, did not accurately perceive many of the characteristics of users. Managers did not feel as strongly about environmental issues as did users. Users responded more intensely than managers to the importance of Solitude in the wild river experinece. Managers appeared to be more development-oriented than did users. Forest Service personnel stressed stronger feeling toward the need for controls on the Middle Fork than did users. The responses to management alternatives were not generally perceived by managers. Middle Fork managers appear to be similar in their responses to those of users which indicates knowledge of the Middle Fork user. Needs include (1) additional information on all factors that may be a result of increasing use, (2) establishing guidelines that will determine when the maximum number of people is attained and controls imposed to correct it, and (3) continual information flow from users.
W74-00551

SUBURBAN AMERICA: POPULATION DYNAMICS AS RELATED TO WATER RESOURCES PLANNING,
Wapora, Inc., Washington, D.C.
B. Wachter, B. Baratz, and G. Beeland.
Available from the National Technical Information Service as PB-225 050/4, $4.75 in paper copy, $1.45 in microfiche. Completion Report. October, 1973. 143 p, 10 fig, 11 tab, 65 ref, 5 append. OWRR C-3384 (3740) (1).

Descriptors: *Census, *City planning, *Decision making, Land development, Local governments, *Long-term planning, Municipal wastes, Municipal water, Project planning, Public benefits, Erosion control, Sediment control, Soil erosion, *Urbanization, Water management (Applied), Zoning, Human population, Land use, Relocation, District of Columbia.
Identifiers: Transportation planning, *Suburban development.

In the past decade, suburban living has rapidly attracted a major fraction of the American population. The current study investigated the degree to which water resources planning was incorporated into the suburbanization phenomenon. To meet this end, personnel of county governments, regional planning commissions, water and sewage agencies, developers etc. were solicited for their appropriate data and experiences. A broad nationwide questionaire survey was performed to develop an overall view of the problem and the solution approaches (if any) that were taken. Also, extensive personal interviews were conducted in Metropolitan Washington, D.C. with responsible officials active and/or knowledgeable in the subject area. The results of the questionnaire and Metro Washington, D.C. surveys indicated several, important areas for consideration. Specifically, the factors of soil condition, transportation planning, industrial relocation, and overlapping of local government interests, all influenced suburban development patterns. These factors were then examined in depth by personal interviews at the following major metropolitan areas: Cleveland, Ohio, Milwaukee, Wisc., Houston, Texas, Pittsburgh, Penn. All of the above efforts resulted in a series of guidelines for water resources planning in suburban areas. These guidelines were designed to provide a useful framework for those engineers and urban designers who are engaged in the future plans for suburban America.
W74-00553

SOCIAL AND CULTURAL IMPACT OF A PROPOSED RESERVOIR ON A RURAL KENTUCKY SCHOOL DISTRICT,
Kentucky Water Resources Inst., Lexington.
C. R. Smith, and P. Drucker.
Available from the National Technical Information Service as PB-224 833, $5.25 in paper copy, $1.45 in microfiche. Research Report No. 60, 1973. 180 p, 23 tab, 6 ref, 2 append. OWRR B-027-KY (1). 14-31-0001-3595.

Descriptors: *Attitudes, Education, Social aspects, *Social change, Social function, *Social impact, Social values, *Kentucky, *Urbanization, Pre-impoundment, Multiple-purpose reservoirs, *Rural sociology, Area redevelopment.
Identifiers: Anthropological concepts, Cultural change, *Cultural values, Urban intrusion.

This study uses anthropological concepts and research methods to study attitudes toward education and the educational system of a central Kentucky school district with the goal of predicting the impact on it of a proposed multi-purpose (flood-control), recreation, etc.) reservoir, and of proposing options for forestalling dysfunctional social aspects of that impact. The social impact will result from the fact that although the county is now rurally oriented, the proposed reservoir will attract (has already begun to attract) urbanite residents from Louisville, Kentucky's largest city, who can be expected to bring urban values concerning education, as well as other urban social values. Massive social change and cultural change can be anticipated. To assess probable directions of change in education, a school in an upper middle class suburb in Louisville, the sort of milieu from which most of the urban intrusion will come, was also studied. This research is another step in the study of changing social function, and changing cultural values in general, in the program, 'Anthropological analysis of sociocultural benefits and costs from stream-control devices.' (Grieves-Kentucky)
W74-00557

IMPACT OF A PROPOSED RESERVOIR ON LOCAL LAND VALUES, ANTHROPLOGICAL ANALYSIS OF SOCIAL AND CULTURAL BENEFITS AND COSTS FROM STREAM CONTROL MEASURES - PHASE 3,
Kentucky Research Inst., Lexington. Water Resources.
P. Drucker, C. R. Smith, and A. C. Turner.
Available from the National Technical Information Service as PB-224 982/9, $4.25 in paper copy, $1.45 in microfiche. Research Report No. 51, 1972. 101 p, 12 map, 4 tab, 8 ref, append. OWRR A-031-KY (1). 14-31-0001-3217.

Descriptors: *Rural sociology, Multiple-purpose reservoir, *Land appraisals, Pre-impoundment,

*Kentucky, *Attitudes, Condemnation, Real property, *Regression analysis, *Relocation, Rural areas, Social change, Social impact, *Social values, *Urbanization, *Benefits, Area redevelopment, Costs.
Identifiers: Anthropological concepts, Anxiety patterns, Dislocation of persons.

This project was designed to study the social impact and economic impact of private pre-construction acquisition of real property in a Central Kentucky rural area in which a multi-purpose dam is planned. The research design was built around use of anthropological concepts and research techniques. By these means it was possible to analyze the attitudes toward, and social values of land to traditionalist residents, among which social and economic security concepts are paramount. Recent land purchases locally believed to have been made for speculative purposes by 'outsiders,' (urbanites from Louisville, Ky), at prices out of line in terms of local agricultural worth, have been extremely unsettling, contributing to the anxiety patterns typical of persons facing forced relocation by sale or condemnation. A newly developing pattern of land purchase, with values related to residential convenience and access to the urban center, rather than to traditional agricultural criteria, is identified through regression analysis. Social change manifested in a partial urbanization is evident among a segment of the local population who try to take advantage of urban economic opportunities while participating in rural society and activities. (Grieves-Kentucky)
W74-00558

A METHODOLOGY FOR ASSESSMENT OF WATER RESOURCES DEVELOPMENT: A COMPETITIVE EVALUATION MODEL FOR WATER RESOURCES DEVELOPMENT PLANNING,
Oklahoma Univ., Norman. Bureau of Water Resources Research.
G. W. Reid, and S. Y. Law.
Available from the National Technical Information Service as PB-224 825, $5.50 in paper copy, $1.45 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report, July 1973. 186 p, 20 fig, 44 tab, 30 ref. OWRR A-036-OKLA (1). 14-31-0001-3836.

Descriptors: *Water Resources Development, Evaluation, Planning, *Benefits, *Decision making, Priorities, Regional analysis, Methodology, System analysis, Measurement, Cost-benefit analysis, River basins, Model studies.
Identifiers: *Competitive evaluation, *Cost-effectiveness analysis, *Game theory, Decision theory, Heuristic gaming, Strategies, Weighting factor, Utility numbers, Expected value.

The purpose was to develop an effective evaluation methodology for assisting in water resources development planning. A new model was contemplated for solving two principal problems associated with the present practices of water resources development planning - the considering of individual development as isolated entity and the using of the benefit and cost ratio as the only analysis in the evaluation process. The model was developed by using game theory concepts. The principal tactics employed in the model are the competitive measuring between benefit categories and the competitive evaluation of the development objectives. The procedure used in the model enables the identifying of the following: the overall system of water resources development as well as the individual or local development, the relationship and priorities of developments in different locations and between various purposes of development. The model is also able to recognize the competitive nature of water resources development and to augment some new measurements. The model as a whole provides a new approach for summarizing a large number of data into a simple and meaningful form in order to formulate systematic recommendations for the decision-maker.
W74-00559

PROTECTING OUR WATER ENVIRONMENT.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 05G.
W74-00743

HONOLULU BOARD OF WATER SUPPLY ANNUAL REPORT FOR THE YEAR ENDED JUNE 30, 1972.
Honolulu Board of Water Supply, Hawaii.

1972. 24 P, 1 FIG, PHOTOS, 4 TAB.

Descriptors: *Water management (Applied), *Administration, *Financing, *Hawaii, Water supply, Coordination, Water analysis, Water delivery, Water distribution (Applied), Water policy, Water rates.
Identifiers: *Honolulu (Hawaii), Quality monitoring.

Projects in planning, resources, and research are discussed. Through negotiations with federal, state, and county agencies and private water users, rules and regulations were adopted for coordinated protection, development, and conservation of water resources. A program for tracing and dating groundwater is in progress. Contamination of water by organic chemicals, as judged by the amount of carbon extractable by chloroform, was negligible. Computer models have been developed to analyze water distribution systems. The Chemical Laboratory has conducted pollution studies, such as pesticide monitoring of sources, and water quality studied, including seepage investigations and system surveillance for water quality deterioration due to stagnation in water mains. Financial statements, as well as operation and pumping information are presented. (Hoffman-North Carolina)
W74-00749

CORONADO RESOURCE CONSERVATION AND DEVELOPMENT PROJECT, PROGRAM OF ACTION.
Soil Conservation Service, Phoenix, Ariz.
For primary bibliographic entry see Field 04A.
W74-00755

AN EVALUATION OF THE WATER-RELATED ECONOMIC RESOURCE DEVELOPMENT OF APPALACHIA-IN-MISSISSIPPI,
Mississippi Research and Development Center, Jackson.
For primary bibliographic entry see Field 06A.
W74-00799

PROGRESS REPORT ON THE PROPOSED YELLOW CREEK PORT PROJECT TISHOMINGO COUNTY, MISSISSIPPI.
Tombigbee River Valley Water Management District, Tupelo, Miss.
For primary bibliographic entry see Field 06A.
W74-00804

SUBJECTIVE DECISION-MAKING FOR URBAN WATER RESOURCES DEVELOPMENT,
Rockwell International Corp., Anaheim, Calif.
J. H. Dean, and C. S. Shih.
Water Resources Bulletin, American Water Resources Association, Vol 9, No 5, p 942-949, October 1973. 3 fig, 9 ref.

Descriptors: Water resources development, *Decision making, *Alternative planning, *Municipal water, *Water supply, Waste water treatment, Dams, Optimization, Engineering, Costs, Water quality, Water quantity, Systems analysis.
Identifiers: *Bayesian decision theory, *San Angelo (Texas), Delphi method, Utility theory, Probability assessments, Public response, Sensitivity analysis, Uncertainty.

The soliciting of expert and general public opinion is indispensable in making choices for the welfare of the general public from alternative courses of action under uncertainty. Bayesian decision theory is utilized to consider engineering alternatives, quality, quantity, cost, and the intangible public response for the selection of optimal strategies in urban water resources development. This approach is capable of incorporating seemingly unquantifiable, abstract factors into the decision-making process. It is a systematic solution procedure used to identify and rank the best alternatives in accordance with the quantitative assessments. The basic elements of the method--decision flow diagrams, judgmental probability assessment, and utility theory--are discussed and illustrated. The analysis is applied to the city of San Angelo in central Texas where alternatives for supplementing a dwindling water supply are being considered: Groundwater development; a waste treatment plant capable of producing potable water; and the building of an additional dam. Use of the Delphi method--an iterative questionnaire technique featuring anonymity, iteration with feedback, and statistical group response--is described. (Bell-Cornell)
W74-00884

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX A--THE PEOPLE AND THE ECONOMY.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00887

IN SEARCH OF NEW METHODS FOR RIVER SYSTEM PLANNING,
Harvard Univ., Cambridge, Mass. Graduate School of Public Administration.
For primary bibliographic entry see Field 04A.
W74-01029

THE HARVARD PROGRAM: A SUMMING UP,
North Carolina Univ., Chapel Hill.
M. M. Hufschmidt.
In: Water Research, Resources for the Future, Washington, D.C. 1966. A. V. Kneese and Smith, S. C. editors, p 441-455. 6 ref.

Descriptors: *Planning, *Water resources, *Analysis, Analytical techniques, *Decision-making, *Methodology.
Identifiers: System design, Basic research, Applied research, *Harvard Water Program.

Initial objectives of the Harvard Water Program for multidisciplinary research and advanced training for public servants in water resources planning and development, were to test the validity and utility of certain new methods and techniques of economic, engineering, and governmental analysis,' with the problems of system design and operation related 'to broader economic data, overall engineering design and economic analysis, public policies, and legal and institutional factors affecting water resources development.' Major research topics developed during Phase I included: the multiple-dimension nature of the social welfare function; the use of concepts of social rate of time discount and opportunity costs; structure of a public investment decision-model for water resources incoprorating the nations of objective function, design criteria, cost-input functions, benefit-output functions, production functions and dynamic analysis; system planning techniques for simulation and mathematical models; and a normative model of political decision-making on public investment. Phase II involved testing of methodology and techniques on realistic planning cases, plus continuing basic research on (a) setting objectives and deriving and applying planning

criteria for field-level planning; and (b) the process of field level planning, including techniques of analysis applicable to complex systems. Some conclusions are that continuity played a major role in the strength of the program, advanced computer technology aided analysis techniques, and university research groups function better on basic research problems than on problems of application. (Edwards-North Carolina).
W74-01030

(THE POTOMAC 1972).
Interstate Commission on the Potomac River Basin, Washington, D.C.

1972. 25 p, 7 fig, photos.

Descriptors: *Water quality, *Water supply, Pollution, *Inter-agency cooperation, *Potomac River, Maryland, Virginia, Pennsylvania, West Virginia, *District of Columbia, Waste water treatment, Flood control, Energy, Financing.
Identifiers: *Intergovernmental coordination, Interstate Commission on the Potomac River Basin (ICPRB), State planning, Washington Area Interstate Water Resources Program, Potomac River Basin Compact, *Washington, D.C.

With no operational, regulatory or enforcement authority, the impact of the Interstate Commission on the Potomac River Basin (ICPRB) is felt through providing liason and assistance to public and private agencies, coordinating programs for use, conservation, and of development of water and land resources, and pollution control. In 1972 ICPRB requested designation by the federal government and the states of Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia as the official coordination agency for both water quality and water resources. The proposed Potomac River Basin Compact to develop water resources planning by a single comprehensive agency has not been approved by all the states. A task force from Md., Va., and D.C. recommended approaches for cleaning up the river and ensuring water supply for metropolitan Washington 'perhaps to the year 2000.' Proposals call for inter-connecting 3 major water supply systems, construction of Verona and Six Bridges Reservoirs, and development and expansion of water treatment and finishing water storage facilities. Advanced treatment of waste must be completed by all treatment plants in the area. Controlling discharges of raw sewage, construction of new treatment plants and implementation of a monitoring system are vital. Sediment problems, water quality, energy supply, B and O Canal, and 1972 Potomac Flood are also discussed. (Hufschmidt-North Carolina)
W74-01032

NORTH CAROLINA WATER PLAN-PROGRESS REPORT, CHAPTER 35-NEW RIVER BASIN.

Draft Progress Report March, 1970. 64 p, 22 tab, 32 ref, 1 append. WRC.

Descriptors: Water resource development, *Planning, *Project planning, *Research priorities, *North Carolina, Coordination, *River basin development.
Identifiers: *Federal-state coordination, *New River Basin (N.C.).

The New River Basin in North Carolina is the head of the New River watershed, a major tributary of the Kanawha River which flows into the Ohio River. Water resources in the Basin are presented, primarily in a tabular format. North Carolina's responses to the Ohio River Basin Comprehensive Survey Report, the Kanawha River Basin Comprehensive Study, and the procedure for the Appalachian Power Company license application to construct the Blue Ridge Hydro-Electric Project are evaluated. The recreation plan of the Blue Ridge Project originally showed 3 park areas in North Carolina and several boat lauching sites. However, according to North Carolina and Virginia, Department of Interior requirements for water quality storage would have destroyed the proposed recreational aspects. This generated a study by the Federal Power Commission, resulting in increasing the size of the reservoirs. Conclusions on water resource development were: (1) major structural projects in or affecting North Carolina will provide greater benefits of power generation, flood control, and low flow augmentation in states other than North Carolina, (2) some existing trout waters will be removed from classification by reservoir characteristics of major impoundments affecting North Carolina, (3) scenic and fishery characteristics need special efforts for preservation or enhancement, and (4) land and population resources are not favorable to either large or water-intensive industry. State and local planning efforts must recognize that the resource needs of the North Carolina portion of the New River Basin will probably be subordinate to larger regional requirements. (Hoffman-North Carolina)
W74-01033

WATER AND SEWER PLAN UPDATE, (GRAY, GEORGIA).
Middle Georgia Area Planning Commission, Macon.
For primary bibliographic entry see Field 05D.
W74-01036

MASTER PLAN FOR MAJOR DRAINAGE: HENRY'S LAKE AREA, SUBBASIN 1-31-55-01-01.
Denver Regional Council of Governments, Colo.

Available from the National Technical Information Service as PB-218 959, $3.00 in paper copy, $1.45 in microfiche. Project Reuse Final Report (Supplement). October, 1971. 89 p, 19 fig, 14 tab. COLO-USE-1. DHUD-H-1392.

Descriptors: *River basin development, *Environmental engineering, *Regional analysis, *Colorado, *Planning, Runoff, Pollution, Drainage, Urban planning.
Identifiers: Major drainage, *Henry's Lake (Colo.), Master planning, *Urban systems engineering.

As the first application of the methodology, criteria, and existing situation description developed under Project REUSE (Renewing the Environment through Urban Systems Engineering), this report was designed to serve as a prototype and standard for future multi-jurisdictional preventive master planning in the Urban Drainage and Flood Control District. The systems engineering approach used is based on a functional description of the urban drainage system. Runoff analyses for existing and various possible future conditions defined the physical magnitude of the system requirements and established a frame of reference for selecting a major drainage concept. An Environmental Design Team reviewed significant problems encountered and assisted in analyzing and evaluating potential concepts. From this, a plan for major drainage was prepared that provides for effective functioning of the major drainage system and orderly development of the Henry's Lake area. Detailed master plan and implementation recommendation are included. The appendix summarizes Project REUSE mathematical models for urban drainage and flood control. (Hoffman-North Carolina)
W74-01037

ANALYSIS OF PORT DEVELOPMENT POTENTIALS AT GREAT SODUS BAY.
Genesee/Finger Lakes Regional Planning Board, Rochester, N.Y.

Descriptors: *Planning, *Harbors, Marinas, Great Lakes, *Lake Ontario, *New York, Recreation demand, Camping, Recreation facilties.
Identifiers: *Recreation development, Resorts, Development potential, *Great Sodus Bay (N.Y.).

Port development potentials of Sodus Bay, an enclosed and naturally protected harbor midway between Rochester and Oswego, New York on the south shore of Lake Ontario are assessed. Until 1967, the Pennsylvania Railroad operated a coal dock on an elevated deep-draft loading pier constructed of heavy creosoted timbers. Increased railroad price structures, a lack of coal storage facilities, and failure to improve harbor facilities gave a competitive advantage to Lake Erie ports. After studying the potential for revival of coal transshipment, the prognosis for revival is negative. With obsolescent facilities and the remoteness of Great Sodus Bay from urban centers, the future for any port facilities is dim. It is possible, but unlikely, that a large-scale bulk commodity-absorbing cement plant, steel mill, electrical power plant, or chemical plant might locate in the vicinity at a future time. Recreational potential for the area is more promising; demands are identified for 150 additional boat slips by 1975 and 330 by 1980, a resort-type lodge of 140 rooms in 1975 or 280 rooms by 1980, 70 to 90 transient housing units immediately, and 455 campsites by 1985. An antique railroad museum is a possibility for the old railroad yeards. Land area requirements are projected for identified recreational needs. Intergovernmental coordination and cooperation are called for to promote recreational development. (Stein-North Carolina)
W74-01039

A SUMMARY REPORT MASTER WATER AND SEWERAGE PLAN.
CIM, Inc., San Luis Obispo, Calif.
For primary bibliographic entry see Field 05D.
W74-01041

SEWERAGE MASTER PLAN, EUGENE-SPRINGFIELD URBANIZING AREA.
Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Ore.
For primary bibliographic entry see Field 05D.
W74-01042

WATER SUPPLY AND SEWAGE FACILITIES PLAN UPDATE-1970.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.

September, 1971. 129 p, 21 tab, 12 maps, 6 append.

Descriptors: *Water supply development, *Projections, *Sewerage, *Pennsylvania, Planning, Networks, Forecasting, Costs, Methodology.
Identifiers: *Priority evaluation, *Lehigh-Northampton Counties (Penn.), Expansion.

The purpose was to update the 1966 Plan and to develop a priority program for 1970-1980. Implementation of water supply facilities had been variable, with only Bethlehem and Easton Water Supply Systems following the 1966 Plan in both substance and timing. Plan revisions were based on new trends in existing water supply system expansion, new population and population density distribution projections, and the narrowed time focus of the update. Trexler Dam and Reservoir, with a new Lehigh Water Supply System as the primary user of this source of water, remained a major recommendation. Proposed expansion of Bethlehem Water Supply System was greater than originally recommended, with a 10.0 mgd. increase source main capacity deemed necessary. Several proposed rural systems were eliminated. All recommendations are tabulated. Including new construction and expansion, approximately 10% of the 1966 Plan recommendations for sewage

treatment facilities were carried out. The 1970 update recommends fewer and larger sewer treatment systems (21 instead of 24). Tables detail the present capacity of sewage treatment works, projected service area population and waste water volume, and recommended new construction, including costs. A numerical evaluation system for water and sewer projects was developed. Points were assigned to each project based on selected criteria. Tables list the rankings of each project, with the Eastern Part of Bethlehem Township ranking highest (88 out of a possible 100 points). (Hoffman-North Carolina)
W74-01045

WATER-RELATED FACILITIES STUDY FOR THE COMPREHENSIVE REGIONAL PLAN OF COLUMBUS AND FRANKLIN COUNTY (OHIO).
Burgess and Niple, Ltd., Columbus, Ohio.

Prepared for Franklin County Regional Planning Commission, Columbus, Ohio. 1969. 137 p. Ohio P-46 (G) X-1105-2.

Descriptors: Planning, *Water supply, *Flood control, Sewerage, Drainage, Flood plains, Water demand, *Comprehensive planning, *Urbanization, Financing, Administration, *Ohio.
Identifiers: Flood Plain Management, Columbus (Ohio), Franklin County (Ohio).

This study focuses on the Columbus, Ohio metropolitan area which includes all of Franklin County plus parts of adjacent counties expected to be urbanized by 1985. The study is closely related to the metropolitan comprehensive planning program and covers water supply, flood control, sewerage, and drainage. The water supply plan emphasizes the full development of local sources of water before turning to major diversions, e.g. from the Ohio River. The flood control program consists of small reservoirs, channel maintenance, and flood plain management. Existing sanitary sewers are expected to be adequate through 1985, but the formulation of policy for future service extensions is important now. Thus, the sections on sewerage and drainage are policy-oriented and cover relations to urbanication and land use planning. A final section discusses financing and implementation of the plans and policies and recommends the creation of a single metropolitan wide agency with both administration and construction powers. (Elfers-North Carolina)
W74-01048

CLASSIFICATION AND EVALUATION OF FRESHWATER WETLANDS AS WILDLIFE HABITAT IN THE GLACIATED NORTHEAST,
Rhode Island Univ., Kingston. Dept. of Forest and Wildlife Management.
F. C. Golet.
In: Transactions of the Northeast Section, The Wildlife Society, Mt. Snow, Vermont, 1973. p 257-279, 5 fig, 2 tab, 22 ref. OWRR B-023-MASS (7). 14-31-0001-3596.

Descriptors: *Wetlands, *Wildlife habitats, *Classification, Evaluation, *Northeast U.S., *Massachusetts, Decision making, Vegetation.

A detailed classification system for freshwater wetlands is presented along with ten criteria for the evaluation of wetlands as wildlife habitat. The results are based on a two-year field study of over 150 wetlands located throughout the State of Massachusetts. The major components of the classification system include wetland classes and subclasses, based on the dominant life form of vegetation and surface water depth and permanence; size categories; topographic and hydrologic location; surrounding habitat types; proportions and interspersion of cover and water; and vegetative interspersion. These components are combined with wetland juxtaposition and water chemistry to produce criteria for wetland evaluation. Using a system of specifications and ranks, wetlands can be arrayed according to their wildlife value for decision-making. (Larson-Massachusetts)
W74-01052

DIFFERENTIAL REPRODUCTION AS A CRITERION FOR EVALUATING DEVELOPMENT DECISIONS,
Oregon State Univ. Corvallis.
C. L. Smith.
Human Organization, Vol 32, No 2, p 177-183, Summer 1973. 1 tab, 16 ref. OWRR-B-023-ORE (3), 14-31-0001-3324.

Descriptors: *Decisionmaking, Planning, Social aspects, *Oregon, *Alternative planning.
Identifiers: *Willamette Valley (Ore), *Differential reproduction, *Housing development.

Differential reproduction, the mechanism by which natural selection operates, is a criterion against which development decisions can be evaluated. The specific decision for which the criterion is used is in determining the relationship between alternatives open to the developers and the mechanisms of social control available to regulatouated a housing development along the Willamette River, Oregon. Accepting a global perspective, based on the systems modeling of Forrester, leads to the conclusion that for this housing development and other developments like it, alternatives should be managed to promote rehabilitation and reuse of land and resources, and mechanisms of social control should be established to limit continued resource exploitation. A global perspective, however, is unlikely in development decisions which are made to benefit specific groups of people until the global impacts of their actions can be shown to affect them.
W74-01056

PROJECT PLANNING,
Bureau of Reclamation, Denver, Colo. Div. of Project Investigations.
For primary bibliographic entry see Field 08A.
W74-01059

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

MARKET PROBLEMS IN THE DISTRIBUTION OF EMISSION RIGHTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 05G.
W74-00674

SEWER SYSTEM COST ESTIMATION MODEL.
Voorhees (Alan M.) and Associates, Inc., McLean, Va.
For primary bibliographic entry see Field 05D.
W74-00745

SYSTEMATIC ERRORS IN COST ESTIMATES FOR PUBLIC INVESTMENT PROJECTS,
North Carolina Univ., Chapel Hill.
M. M. Hufschmidt, and J. Gerin.
In: The Analysis of Public Output, National Bureau of Economic Research, New York. 1970. J. Margolis, editor, p 268-315, 6 fig, 9 tab.

Descriptors: *Tennessee Valley Authority, *Estimated Costs, *Construction costs, Administration, Coordination, Projects.
Identifiers: *Cost overrun, Water-resource construction agencies, Errors, *Public investment projects.

The extent, nature and causes of error in estimating costs of public investment are discussed. Analysis is based on cost experience of the 3 largest U. S. water-resource construction agencies: the Army Corps of Engineers, Bureau of Reclamation and TVA--from 1933 to the early 1960's. With no adjustments for construction price levels, TVA cost overrun for dams and reservoirs is 22% of original estimated cost; Corps overrun is 124% for projects built or building prior to 1950, 36% for those completed between 1951 and 1964; while Reclamation overrun is 177% for projects build or building prior to 1955, 72% for all those built or building in 1960. Frequency of cost overruns were: TVA dams and reservoirs, 45%; Corps projects complete 1951-1964, 72%; all Reclamation projects built or building prior to 1955, 85%, for projects built in 1960, 75%. With adjustments for construction price levels, overrun tendencies are less. The first are price increases or authorized project extensions of changed local needs. Underlying factors may be further grouped in two classes: (1) those related to the project and the timing of survey and construction, and (2) those related to the administrative and institutional framework. Tentative conclusions are: that organizational and administrative context is the important variable; that agencies have achieved considerable improvement since the 1950's so that current performance shows no significant bias toward cost underestimation; and that recent agency experience reveals persistence of a sizable variance of error in spite of improvements. Implications for policy and administration are presented. (Edwards-North Carolina)
W74-00751

THE ECONOMICS OF THE CATTLE FEEDING INDUSTRY IN ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
E. L. Menzie, W. J. Hanekamp, and G. W. Phillips.
Arizona Agricultural Experiment Station Tucson, Technical Bulletin 207. Oct. 1973. 82 p, 36 fig, 57 tab, 35 ref.

Descriptors: *Feed lots, *Farm wastes, *Cattle, *Zoning, *Cost analysis, Marketing, *Arizona, Legal aspects, Water pollution sources, Environmental effects, Economics.

Major objectives were to determine changes in the growth and structure of the cattle feeding industry, costs of operation, costs of custom feeding, production problems affecting the competitive nature of the industry, and to analyze the nature of growth and development in beef markets. Data are based on 1972 information, and projections have been made to 1982. Considerable attention is paid to the Arizona feed situation, supply of feeder cattle for Arizona, controls affecting livestock feeding; sources, methods, and costs of finance for feedlots and feeding, marketing of fat cattle and beef, and an assessment of Arizona's competitive position in beef production and marketing, along with the role of changing technology in the industry. The section on controls includes a review of health and sanitation problems of Arizona feedlots, the control of feed supplements, and environmental issues. A particular case involving a suit brought by a land developer against a cattle feeding operation with a non-conforming prior usage right is described; the developer was required to pay for costs involved in the relocation of the feedlot. Consideration of the effect of feedlot wastes on water quality has given rise to a number of research investigations relating to recycling, conversion to other products, confinement feeding, etc., all of which should be accelerated because of the rising demand for beef at the same time that feedlot controls are creating limitations on this type of beef production. (Paylore-Arizona)
W74-00758

BANKS STUDY BASIN CLEANUP.
For primary bibliographic entry see Field 05D.
W74-00772

WATER SUPPLY AND WASTE DISPOSAL POLICY REVIEW.
Indian Nations Council of Governments, Tulsa, Okla.
For primary bibliographic entry see Field 05D.
W74-00809

NONLINEAR EFFLUENT CHARGES,
California Univ., Riverside.
For primary bibliographic entry see Field 05G.
W74-00886

6D. Water Demand

THE USE OF GROUNDWATER IN MINNESOTA,
Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
For primary bibliographic entry see Field 04B.
W74-00568

A REPORT OF PROGRESS AND CONCLUSIONS, (WASHINGTON, D.C. METROPOLITAN AREA WATER RESOURCES).
Washington Area Interstate Water Resources Program, D.C.

Available from NTIS, Springfield, Va., 22151 as PB-214 959 Price $3.00 printed copy; $1.45 microfiche. January 1973. 35 p, 7 fig, 1 tab.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *District of Columbia, Water demand, Water supply, Projections, Water quality, Hydrologic data, Reviews, Evaluation, Water treatment, Potomac River, Tributaries, Estuaries, Water utilization, Human population.
Identifiers: *Washington, D.C. metropolitan area.

In recent years the Washington metropolitan area has experienced an explosive growth in population. Construction of housing, highways and shopping centers has resulted in widespread erosion and increased volumes of stormwater from ever-expanding roof and paved areas. Also, this growth has been accompanied by increasing demands for normal services such as water supply and wastewater treatment. Yet, no provision has been made for adequate water supply, and wastewater treatment facilities, badly in need of expanding and upgrading, continue to pour pollutants into streams which are already degraded below applicable stream standards. The Governors of the States of Maryland and Virginia and the Commissioner of the District of Columbia recognized the critical need for concerted action on a regional basis. By joint resolution they formed a policy committee and a task force of representatives of the three jurisdictions and the Metropolitan Washington Council of Governments to develop an action program which would provide solutions to the water resources problems of the area. Since August 16, 1972, the task force has performed an intensive review of previous investigations, prepared a detailed analysis of future needs and existing facilities, and consulted with as many of the officials of local jurisdictions and citizen groups as time would permit. A summary of the analysis of needs vs facilities is included. (Woodard-USGS)
W74-00583

EL PASO'S WATER RESOURCES,
El Paso Water Utilities, Tex.
J. T. Hickerson.
Presented at: Planning Seminar 'El Paso's Challenge: Reality or Myth,' February 8, 1966, El Paso, Texas. 18 p, 7 fig.

Descriptors: *Water supply, *Water sources, *Water requirements, *Projections, *Water reuse, *Texas, Planning, Groundwater, Water rights, Desalinization, Water users, Water rates.
Identifiers: *El Paso (Tex), Rio Grande River.

For the El Paso region indicate that per capita use of water by 2020 will be 250 gallons per day and that the population will be about 900,000. Total accumulated water reauirements to 2020 are projected and additional sources of water to meet this demand are discussed. Present water supply sources are the Rio Grande River and local groundwater. River flows are quite variable and groundwater is used largely for peak demand, especially in the summer. Possible additional sources of water include the importation of water from other areas, the desalinization local brackish water (possibly from the Lower Valley Area), the blending of brackish water with good quality water (already being done in some cities), and the reclamation of wastewater. Two other possibilities are the expanded use of the present river and groundwater resources; the former would require new legal arrangements while the latter would involve increased mining of the groundwater, i.e. withdrawing it faster than it is being replenished naturally. (Elfers-North Carolina)
W74-00740

FINDINGS OF THE NATIONAL WATER COMMISSION,
National Water Commission, Arlington, Va.
For primary bibliographic entry see Field 06A.
W74-00812

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX B, THE LAND--RESOURCES AND USE, VOLUME II.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00889

WATER AND SEWER SERVICE NEEDS OF LOW AND MODERATE INCOME HOUSEHOLDS IN METROPOLITAN WASHINGTON.
Metropolitan Washington Council of Governments, D.C.
For primary bibliographic entry see Field 05D.
W74-01034

PUBLIC WATER SUPPLIES OF NORTH CAROLINA, PART I NORTHERN PIEDMONT,
Geological Survey, Raleigh, N.C.
N. M. Jackson, Jr.
North Carolina Office of Water and Air Resources, Raleigh. July, 1972. 277 p, 4 fig, 63 maps, 45 tab, 5 ref.

Descriptors: *Water supply, *Water sources, *Water quality, Water storage, Water pumping, Planning, Chemical analysis, *North Carolina.
Identifiers: *Piedmont (NC), Public Water Supply Systems.

An inventory is presented of the public water supply systems in 18 counties in the northern Piedmont of the state of North Carolina. This area includes several major urban areas such as Greensboro, Winston-Salem, High Point, Raleigh, and Durham. Data presented are useful to planners and water managers interested in water availability, water resources development, and water quality. A county-by-county inventory (including maps) are presented. Information is provided on the population served, source of water, estimated allowable draft, industrial water use, raw and finished water storage, raw and finished water pumping capacity, future plans for expansion, chemical analyses of the raw and finished water, and an appraisal of the water supply source. Various categories of data presented and of the inventory procedures are explained. (Elfers-North Carolina)
W74-01040

SEWERAGE MASTER PLAN, EUGENE-SPRINGFIELD URBANIZING AREA.
Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Ore.
For primary bibliographic entry see Field 05D.
W74-01042

AREAWIDE WATER AND WASTE WATER PLANNING STUDY FOR THE ST. CHARLES MESA, RYE-COLORADO CITY, AND BEULAH SECTORS OF PUEBLO COUNTY.
Sellards and Grigg, Inc., Lakewood, Colo.
For primary bibliographic entry see Field 05D.
W74-01047

6E. Water Law and Institutions

TRENDS IN ENVIRONMENTAL LAW RELATED TO WATER RESOURCES PLANNING,
Auburn Univ., Ala. Center for Urban and Regional Planning.
D. D. Bracken.
Available from the National Technical Information Service as PB-224 824, $4.25 in paper copy, $1.45 in microfiche. Alabama Water Resources Research Institute, University Bulletin 16, 1973. 119 p, 4 append. OWRR X-132 (9074).

Descriptors: *Planning, Legal aspects, *Water rights, *Decision making, Standards, *Water law, State governments.
Identifiers: *Environmental law trends, Environmental standards.

Basic legal questions are gaining increasing attention in environmental actions in courts. The directions courts will take can have substantial impact on governmental decision-making bodies responsible for water resources planning. This study identified and discussed patterns and potential trends in four major areas of environmental law with twenty-one legal experts. Areas of consensus on developing patterns of significance for agency planning are reported. Broadened standing to sue requirements in state and federal courts suggest that agencies should not rely on lack of standing of individuals or groups to keep an environmentally significant decision from being litigated. Increased legislative and judicial protection of citizen rights to participate in agency decision-making and to force compliance with regulatory standards will also have an impact on agency decision-making procedures. Results in two remaining areas, expansion of Constitutional rights to include a right to a healthy environment and new interpretations of present common law doctirnes and/or promulgation of new doctrines including public trust, were not as indicative of consensus on trends or their potential impact on agency activities. Evolution in legal doctrine is difficult to ascertain. But, given the import of trends in environmental law on decisions resulting in allocation of scarce national resources and this study's demonstration of the feasibility of identifying areas of consensus among legal experts, the development of indices of legal patterns as an input for agency decision-making models should be further investigated.
W74-00552

SUBURBAN AMERICA: POPULATION DYNAMICS AS RELATED TO WATER RESOURCES PLANNING,
Wapora, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-00553

QUALITY MANAGEMENT FOR WISCONSIN: A REPORT ON PRESERVING AND IMPROVING THE QUALITY OF THE AIR, LAND AND WATER RESOURCES.
For primary bibliographic entry see Field 05G.

W74-00715

BODEGA: A CASE HISTORY OF INTENSE CONTROVERSY,
For primary bibliographic entry see Field 06G.
W74-00738

REGIONAL WATER SUPPLY/SEWAGE DISPOSAL PLAN AND SHORT-RANGE PROGRAM, 1973-1978.
Central New York Regional Planning and Development Board, Syracuse.
For primary bibliographic entry see Field 05D.
W74-00753

SAMPLING AND ANALYSIS OF CHEMICAL POLLUTANTS IN RIVER WATER,
Lee Conservancy Catchment Board (England).
For primary bibliographic entry see Field 05A.
W74-00773

CHEMICAL ANALYSIS OF WATER EFFLUENTS -- LESSONS FROM THE U.S. (ARMY CORPS OF ENGINEERS) PERMIT PROGRAM,
Institute of Paper Chemistry, Appleton, Wis. Div. of Natural Materials and Systems.
For primary bibliographic entry see Field 05A.
W74-00791

WATER REUSE IN INDUSTRY, PART 5 -- THE WATER POLLUTION CONTROL ACT: REACHING TOWARD ZERO DISCHARGE,
Polytechnic Inst. of Brooklyn, N.Y.
For primary bibliographic entry see Field 05D.
W74-00798

A BILL TO BE KNOWN AS THE 'SAFE DRINKING WATER ACT OF 1973'.
For primary bibliographic entry see Field 05F.
W74-00856

WALSH V. SPADACCIA (PROCEEDING TO SET ASIDE DETERMINATION OF TOWN BOARD APPROVING CONSTRUCTION PLANS WHICH DID NOT CONSIDER POLLUTION OF LAKE).

343 N.Y.S.2d 45-55 (Sup Ct, Westchester County 1973). 11 p.

Descriptors: *Zoning, *Septic tanks, *New York, *Sewage effluents, Project planning, City planning, Judicial decisions, Land use, Land development, Water pollution sources, Legal review, Administrative decisions, Legislation, Local governments.
Identifiers: Administrative regulations.

Plaintiffs, two unincorporated associations of homeowners and four individual homeowners, brought suit to vacate the approval by the town board of the site plan for a large apartment complex. Plaintiffs alleged that the board had acted arbitrarily and capriciously in rendering its approval in that it had not given consideration to the effect of the apartments on the pollution of an adjacent lake resulting from septic tanks. The plans submitted to the board did not meet local standards in many respects, particularly in regard to the sewer system. This was becuase, in making its decision, the board had relied on the County Health Department as far as sewage requirements were concerned, and the Health Department was unaware of the stringent requirements of this particular township. The court found that the town board had acted arbitrarily and capriciously in disregarding the township requirements relevant to septic systems and therefore annulled the approval of the site plan. (McKnight-Florida)
W74-00857

INCREASING PROTECTION FOR OUR WATERS, WETLANDS, AND SHORELINES: THE CORPS OF ENGINEERS.

Seventeenth Report--Comm. on Government Operations, 92d Cong, 2d Sess, August 10, 1972. 49 p, 1 append.

Descriptors: *Wetlands, *Shores, *Navigable waters, *Water resources development, Legal aspects, Jurisdiction, Rivers and Harbors Act, Water quality standards, Exploitation, Jurisdiction, Water pollution sources, Landfills, Dredging, Permits, Administrative agencies.
Identifiers: *Corps of Engineers, Coastal waters, Coastal zone management, Fill permits.

The report is based on several hearings and ongoing studies conducted by the Subcommittee concerning the role of the Corps of Engineers in Administering and protecting the Nation's wetlands and waterways. The hearings and studies revealed that the Corps in the past has exercised its responsibilities over navigable waters with a more restrictive view of its responsibilities than is required by law; and that this self-imposed limitation has resulted in less effective protection for many waters, wetlands, and shorelines. Recent developments in the Corps' efforts to broaden its protection of waters and wetlands are reviewed, and additional steps which should be taken to accomplish that objective are discussed. The Corps of Engineers has major statutory responsibilities affecting these waterways, shorelines, and wetlands. The Corps approves annually thousands of applications for permits and letters of permission under the Rivers and Harbors Act of 1899 to dredge, fill, construct structures in or discharge refuse into navigable waters. A list of conclusions and principal recommendations is included. (Mockler-Florida)
W74-00858

THE DRAFT UNITED NATIONS CONVENTION ON THE INTERNATIONAL SEABED AREA--AMERICAN PETROLEUM INSTITUTE POSITION,
American Petroleum Inst., New York.
For primary bibliographic entry see Field 05G.
W74-00859

A BILL TO AUTHORIZE CONSTRUCTION OF THE LITTLE CYPRESS LAKE AND RESERVOIR, TEXAS.

House Bill 5297, 93rd Cong, 1 st Sess (1973), 2 p.

Descriptors: *Legislation, *Texas, *Reservoirs, *Reservoir construction, Lakes, Reservoir sites, Legal aspects, Planning, Water resources development, Federal budget.

The bill authorizes the construction of the Little Cypress Lake and Reservoir, Texas, by the Secretary of the Army, acting through the Chief of Engineers, in accordance with existing, specified plans. Construction is not to be initiated until it has been approved by the Secretary of the Army and the President. (Reed-Florida)
W74-00861

A BILL TO PROVIDE FOR THE ESTABLISHMENT OF THE LOWELL HISTORIC CANAL DISTRICT NATIONAL CULTURAL PARK.
House Bill 4514, 93rd Cong, 1st Sess (1973). 5 p.

Descriptors: *Massachusetts, *Legislation, *National Historic Parks, *Recreation, *United States, Education, Legal aspects, Planning, Administration, Contracts, Governmental interrelations, Local governments, Recreation facilities.
Identifiers: *National Cultural Parks, *Tort liability, *Indemnification.

The proposed bill authorizes the Secretary of the Interior to establish the Lowell Historic Canal District National Cultural Park in Lowell, Massachusetts. The Secretary is authorized, with the concurrence of the Lowell Historic Canal District Commission established under this proposed act, to designate certain properties in the city of Lowell for establishment as the park. The means by which the Secretary may acquire the necessary lands and personal property are specified. The bill authorizes the Secretary to cooperate and enter into agreements with the Commission, State and local public bodies, and private interests relating to the acquisition, planning, development or use of real and personal property for educational, cultural, historic or recreational purposes. The Secretary may agree to indemnify any private individual partnership or corporation, which entered into an agreement with the Secretary to construct, maintain and operate a public facility in accordance with plans and standards established by the Commission. (Reed-Florida)
W74-00862

A BILL TO AMEND THE RIVER AND HARBOR ACT OF 1973 RELATING TO THE CHICAGO RIVER, ILLINOIS.

House Bill 271, 93rd Cong, 1st Sess (1970). 2 p.

Descriptors: *Legislation, *Channel improvement, *Rivers and Harbors Act, *Illinois, Rivers, Navigation, Flood control, Water pollution control, Water pollution, Legal aspects, Water resources development, Flood protection.
Identifiers: *Unsightliness.

The proposed bill provides for the amendment of the Rivers and Harbors Act so as to authorize the Secretary of the Army to undertake measures to clear the channel of the North Branch of the Chicago River, Illinois, of objects which contributes to flooding, unsightliness and pollution of the river and to maintain the channel free of such objects. The proposed amendment also specifies appropriation limitation for the project. (Reed-Florida)
W74-00863

A BILL TO PROVIDE FOR THE ESTABLISHMENT OF THE POTOMAC BASIN NATIONAL RIVERWAYS.

House Bill 1884, 93rd Cong, 1st Sess (1973). 11p.

Descriptors: *Legislation, *River basin development, *Recreation, Comprehensive planning, Land use, Aesthetics, Legal aspects, Water quality standards, Water pollution control, Aquatic habitat, Wildlife conservation, Federal government, Governmental interrelations.

This bill seeks to preserve and develop for the enjoyment of all the waters of the Potomac River Basin and adjacent land areas. The legislation further provides that the Secretary of the Interior (Secretary) shall encourage state, regional, country, and municipal bodies to adopt and enforce adequate master plans and zoning ordinances which will promote the use and development of private property within and adjacent to the national riverways in a manner consistent with the Act. He is authorized to provide technical assistance to such bodies in the development and adoption of such plans. Moreover, the Secretary shall permit hunting and fishing on lands and waters under his jurisdiction within the boundaries of the Potomac Basin National Riverways in accordance with the appropriate federal and state laws, except that he may designate zones where, and establish periods when, no hunting or fishing shall be permitted for reasons of public safety, administration, fish or wildlife management, or public use and enjoyment. (Mockler-Florida)
W74-00864

A BILL TO AUTHORIZE THE ACQUISITION OF THE BIG CYPRESS NATIONAL FRESH WATER RESERVE.
House Bill No 46, 93rd Cong, 1st Sess (January 3, 1973). 6 p.

Descriptors: *Legislation, *Florida, *Swamps, Environmental effects, Recreation, Wildlife habitat, Aquatic environment, Wetlands, Marshes, Aquatic habitats, Mangrove swamps, Standing waters, Freshwater fish, Wildlife, Small game.

This bill would authorize the acquisition of the Big Cypress National Fresh Water Reserve in the State of Florida because the unique natural environment of this area should be protected from further development which would significantly and adversely effect its ecology. The proposed bill would authorize the Secretary of the Interior to: acquire by donation, purchase with donated or appropriated funds, transfer from any other federal agency, or exchange land and interests within the area in question. The proposed boundaries of the area may not encompass more than five hundred and forty-seven thousand acres of privately owned land. Property owned by the State of Florida or any political subdivision thereof may be acquired only by donation. The Secretary shall permit hunting, fishing, and trapping on lands and waters under his jurisdiction within the reserve in accordance with the applicable laws of the U.S. and the State of Florida except that he may designate areas and times in which no hunting, fishing, or trapping will be permitted for reasons of public safety or public use and enjoyment. (Mockler-Florida)
W74-00865

COMMONWEALTH V. BARNES AND TUCKER COMPANY (SUIT FOR MANDATORY INJUNCTION REQUIRING DEFENDANT TO TREAT ACID MINE DRAINAGE FROM MINE).
303 A.2d 544-575 (Pa. Cmwlth. 1973).

Descriptors: *Judicial decisions, *Mining, *Drainage, *Legal aspects, *Pennsylvania, Nuisance, Acid mine water, Mine drainage, Mine wastes, Mine water, Waste dumps, Public health, Water quality standards, Water law.
Identifiers: Nuisance (Legal aspects).

This case involved a complaint in equity for a mandatory injunction brought by the complainant-state against the defendent mine owner requiring the defendent to treat acid mine drainage discharging from the company's mine, as the discharge did not meet the minimum water quality standards. The court held for the defendent who held a time-extended mine drainage permit under the 1965 amendment to the Clean Streams Law. The court held the defendant did not assume the responsibility, by reason of the provisions of the Clean Streams Law or regulations promulgated thereunder then in effect, for any mine drainage discharge after the cessation of mining and that it was not the responsibility of the defendant to abate the water's polluting qualities. Moreover, the court indicated that the mine water discharge consituted neither a public nuisance under the Clean Streams Law nor a common-law nuisance for which the defendent would be responsible. (Mockler-Florida)
W74-00866

ARE OCEAN POLLUTERS SUBJECT TO UNIVERSAL JURISDICTION--CANADA BREAKS THE ICE,
For primary bibliographic entry see Field 05G.
W74-00867

NATURAL RESOURCES DEFENSE COUNCIL INC. V. GRANT (ACTION TO PERMANENTLY ENJOIN CONSTRUCTION OF WATERSHED PROJECT).

355 F. Supp 280-290 (E.D.N.C. 1973).

Descriptors: *North Carolina, *Environmental control, *Environmental effects, *Judicial decisions, *Federal jurisdiction, Sediment control, Sediment discharge, Watershed management, Regulation, Administrative agencies, River and Harbors Act, Eutrophication, Legal aspects, Ecology, Aquatic habitats, Judicial review.
Identifiers: *National Environmental Policy Act, *Injunctive relief, *Environmental impact statement.

Plaintiffs, private environmental groups, sought injunctive relief claiming that defendents, government officials, failed to satisfy the requirements of the National Environmental Policy Act of 1969 (NEPA) and that implementation of the project would violate section 13 of the Rivers and Harbors Act of 1899. The preliminary injunction was granted until an environmental impact statement was filed according to NEPA. After filing of the final impact statement the injunction was dissolved. Plaintiffs moved for new injunction pending appeal. The Court of Appeals remanded for a preliminary hearing on the adequacy of the final statement. The court on remand found: (1) the statement misrepresented the adverse environmental effects of the project upon fish habitat. (2) misrepresented effect upon fish resources, (3) ignored effect on potential eutrophication problems in Tar Pamlico estuary, (4) failed to disclose maintenance history of PL 566 Projects, (5) ignored serious environmental consequences of proposed use of Kudzu, (6) did not disclose or discuss cumulative effects, (7) failed to fully disclose or adequately discuss alternatives. The court therefore found the final statement was not a 'full disclosure' as required by NEPA and granted the new preliminary injunction. (Napolitano-Florida)
W74-00868

EFFLUENT NEIGHBORS: THE MEXICO--UNITED STATES WATER QUALITY DILEMMA,
For primary bibliographic entry see Field 05G.
W74-00869

WATER POLLUTION--USER OF CITY SEWER SYSTEM CREATES NUISANCE AGAINST LOWER RIPARIAN,
For primary bibliographic entry see Field 05G.
W74-00870

REPORT OF PROCEEDINGS AT PUBLIC HEARING RELATING TO AN APPLICATION FILED BY AROUSED RESIDENTS OF CROWDERS CREEK INC. REQUESTING RECLASSIFICATION OF CROWDERS CREEK, CATAWBA RIVER BASIN, CLEVELAND AND GASTON COUNTIES .
For primary bibliographic entry see Field 05G.
W74-00871

PROJECTS PROPOSED FOR INCLUSION IN OMNIBUS RIVER AND HARBOR AND FLOOD CONTROL LEGISLATION--1972.

Joint Hearings--Subcomm. on Rivers and Harbors and Subcomm. on Flood Control and Internal Development--Comm. on Public Works, U.S. House of Representatives, 92d Cong, 2d Sess, February and March 1972.

Descriptors: *Federal government, *Legislation, *Rivers and Harbors Act, *Flood control, Navigation, Erosion, Wildlife habitat, River basin development, Resources development, Environmental effects, Comprehensive planning, Water resources development.

Testimony was given in joint congressional hearings to consider projects proposed for inclusion in the Omnibus River and Harbor and Flood Control legislation of 1972. The committee heard testimony from representatives of the U.S. Corps of Engineers, members of Congress, and citizens concerning 26 new flood control and river and harbor projects costing over $205 million. This number includes six projects dealing with navigation and beach erosion control, 18 on flood control and hurricane protection, and 2 for fish and wildlife projects. Specific projects considered included the Edwards Underground Reservoir in San Antonio, Texas, the Arkansas River Basin Project, the Pecos River project near Alpine, Texas, the North Shore project in Long Island, New York, and the Hoorah Harbor Project in Alaska. Alternatives to the proposed projects as well as adverse environmental effects of the proposals are given, and charts, graphs, and other illustrations are included. (Mockler-Florida)
W74-00872

DESIGNATION OF WILDERNESS AREAS, PART II.
Hearings--Subcomm. on Public Lands--Comm. on Interior and Insular Affairs, U.S. House of Representatives, 92d Cong, 2d Sess, 1972. 301 p.

Descriptors: *Legislation, *National forests, *Wildlife, *Wildlife conservation, *United States, Administration, Governments, Legal aspects, Planning, Regulation, Boundaries (Property), Contraints, Montana, Oregon, Colorado.
Identifiers: *Wilderness areas.

The purpose of the hearings was to consider several bills dealing with wilderness areas. The bills would authorize and direct the Secretary of Agriculture to classify as wilderness the national forest lands in certain parks of Montana; add and modify the boundaries of the Wellowa National Forest in Oregon; and authorize the Secretary to review as to its suitability for preservation as wilderness, the Indian Peaks area in Colorado. Reports from the Departments of Agriculture and Interior were made to the subcommittee as were statements from various interested private conservation and wildlife organizations. Statements were also given by a number of representatives from governmental agencies. (Reed-Florida)
W74-00873

LONE PEAK WILDERNESS AREA, UTAH, AND DESIGNATING A SEGMENT OF THE COLORADO RIVER IN UTAH AS PART OF THE WILD AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 04C.
W74-00874

RESTORE RURAL WATER AND WASTE DISPOSAL GRANT PROGRAMS.
For primary bibliographic entry see Field 05G.
W74-00875

FIVE YEAR EXTENSION FOR RESEARCH AND DEVELOPMENT, PUBLIC LAW 92-60 (FINAL ENVIRONMENTAL STATEMENT).
Office of Saline Water, Washington, D.C.
For primary bibliographic entry see Field 03A.
W74-00876

ARKANSAS SOIL AND WATER CONSERVATION COMMISSION.

Arkansas Stat. Ann. secs 9-101 thru 9-128 (Supp. 1971).

Descriptors: *Legislation, *Water resources development, *Conservation, *Arkansas, Administration, Interstate waters, Watershed management, Flood control, Soils, Navigation,

Water quality management, Governmental interrelations.

This act creates the Arkansas Soil and Water Conservation Commission. The Commission shall consist of seven members to be appointed by the Governor and approved by the Senate. Each congressional district shall be represented by membership on the Commission. The Act provides that the Commission shall have the authority to enter into negotiations with the duly authorized representatives of adjoining states as to the protection and use of interstate waters in streams, lakes, reservoirs, or natural or artifical channels of impoundments. The Commission is empowered to employ a water resources engineer. In addition, the Commission shall cooperate with federal agencies in the development of their plans for federal public works under the Public Works Acceleration Act, or other federal law of similar import, in such projects as small watersheds, river and harbor, flood control, soil conservation, river navigation, and hydroelectric power. Moreover, the Commission may take such other action as it shall deem necessary or desirable to carry out the purposes and intent ofthe Act. (Mockler-Florida)
W74-00878

LOUISIANA GOVERNMENT AND THE COASTAL ZONE-1972.
March, 1972. 45 p, 4 fig.

Descriptors: *Planning, *Coastal marshes, *Environmental effects, *Ecosystems, Wetlands, Urbanization, Land use, Administration, Coordination, Institutions, *Louisiana.
Identifiers: *Coastal zone management, State agencies.

Louisiana Act 35 of 1971 charged the Louisiana Advisoty Commision on Coastal and Marine Resources to prepare a Coastal Zone Management Plan by September 15, 1973. This is the first progress report on the planning efforts. Emphasis is on describing the nature of Louisiana's coastal zone including the problems related to the strong pressures for industrial development and analyzing the state institutional structure for management of the coastal zone. The coastal zone is a delicately balanced and highly vulnerable ecosystem. Thus, uncoordinate activities including urban and industrial development and flood control projects have changed natural processes and adversely affected fish and wildlife. The Coastal Zone Management Plan would promote orderly development, protect environmental resources and processes, and coordinate state and private agencies and groups. A key problem in the past has been a lack of state policy on coastal zone management and the lack of coordination among state agencies with regard to activities related to ecologic processes, for example, water quality management. Thus, 23 state agencies whose activities have a significant effect on coastal and marine resources are analyzed. (Elfers-North Carolina)
W74-01028

NORTH CAROLINA WATER PLAN-PROGRESS REPORT, CHAPTER 35-NEW RIVER BASIN.
For primary bibliographic entry see Field 06B.
W74-01033

WETLANDS '73: TOWARD COASTAL ZONE MANAGEMENT IN LOUISIANA.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.
For primary bibliographic entry see Field 02L.
W74-01043

6F. Nonstructural Alternatives

FLOOD MANAGEMENT PLAN--WARNING, DAMAGE, COORDINATION.
Denver Regional Council of Governments, Colo.

Available from NTIS, Springfield, Va. 22151 as PB-218 963 Price $3.00 printed copy; $1.45 microfiche. Project Reuse Report DRCOG-72-009, June 1972. 46 p, 2 fig, 1 tab, append. HUD Contract 1392.

Descriptors: *Flood control, *Flood forecasting, *Flood data, *Hydrologic data, *Cclorado, Flood damage, Flood plain zoning, Flood routing, Erosion control, Sediment control, Streamflow, Rainfall-runoff relationships, Flow characteristics, Flow augmentation, Flood profiles, Flood protection.
Identifiers: *Flood management plan (Colo), *Denver region (Colo).

A review of the status of existing mechanisms for flood warning and prediction within the Denver region was undertaken to define the degree of responsibility of various federal, state and local agencies for flood warning and protection. Current efforts of the Colorado Department of Natural Resources, through the State Engineer's Office, to automate the collection and recording of information on streamflows and water right diversions, were reviewed to provide compatibility between the flood warning system and the State Engineer's administrative data collection procedures. The responsibility and current capability of the National Weather Service (Weather Bureau) have also been investigated, to provide for their continued inclusion in, and coordination with, the program. In support of a broad flood management program, encompassing prevention of future losses as well as warning of impending danger, a method of monitoring, recording, and analyzing actual damage is described. (Woodard-USGS)
W74-00817

A PROGRAM FOR STORM DRAINAGE AND FLOOD CONTROL-1971-1990: DAMAGE PREVENTION, MAJOR DRAINAGEWAYS, MASTER PLANNING, REGIONAL MANAGEMENT.
Denver Regional Council of Governments, Colo.

Available from the National Technical Information Service as PB-218 961, $3.25 in paper copy, $1.45 in microfiche. Project REUSE Final Report (Supplement). August, 1972. 94 p, 14 fig, 10 tab. COLO-USE-1. DHUD-H-1392.

Descriptors: *River basin development, *Regional analysis, *Flood plain zoning, *Storm runoff, Criteria, Standards, Forecasting, Flood control, Runoff, Coordination, *Colorado, Urban runoff, Urban drainage.
Identifiers: Preventive master planning, Detention ponding, *Denver SMSA (Colo), Design master planning.

The Denver Standard Metropolitan Statistical Area, Adams, Arapahoe, Boulder, Denver and Jefferson Counties, is drained by the South Platte river and its tributaries. Urbanization, heavy runoff from snowmelt, and high intensity localized storms combine to create severe flooding. This proposed major drainage program to provide up to 100 year frequency and flood runoff protection is divided into a short-range program (through 1975) with emphasis on preventive multi-jurisdictional master planning and design master planning, and the long-range program (1976-1990), where emphasis will shift to construction. Short range objectives are: completion of 320 channel miles of preventive master planning and 97 miles of design master planning concentrated on high and moderate potential flood damage areas; (2) reduction of backlog of major drainage needs; (3) protection from a 100 year frequency storm for 42% of the area by preventive measures, facilities, and/or flood insurance; and (4) development and enforcement of a runoff control ordinance. During the construction period emphasis will shift to attainment of 100 year protection for all areas except in areas where costs are prohibitive. Here flood insurance coverage can be provided. Programs for each period are detailed including project scheduling and timing. Implemention stratey and recommendations are based on criteria developed under Project REUSE (Reviewing the Environment through Urban Systems Engineering). Financing, organization, flood plain zoning and insuracne, and detention ponding are discussed. (Hoffman-North Carolina)
W74-01038

6G. Ecologic Impact of Water Development

TRENDS IN ENVIRONMENTAL LAW RELATED TO WATER RESOURCES PLANNING,
Auburn Univ., Ala. Center for Urban and Regional Planning.
For primary bibliographic entry see Field 06E.
W74-00552

LEAST-COST ALLOCATION AND VALUATION MODEL FOR WATER RESOURCES,
city Univ. of New York. Dept. of Mathematics.
For primary bibliographic entry see Field 05D.
W74-00670

BODEGA: A CASE HISTORY OF INTENSE CONTROVERSY,
J. W. Hedgpeth.
In: Environmental Quality and Water Development, W. H. Freeman, and Co. San Francisco, 1973. C. R. Goldman editor, p 438-454, 3 fig, 7 ref.

Descriptors: *Recreation, *Shores, *Powerplants, *Thermal pollution, *Nuclear powerplants, Earthquakes, Political aspects, *California, Radioactivity, Safety.
Identifiers: Sonoma County (Calif), San Andreas Fault, *Bodega Head (Calif).

Bodega Head, a small peninsula north of San Francisco Bay adjacent to the San Andreas fault, was announced in the late 1950s as the proposed site for an atomic power plant by Pacific Gas and Electric Company (PG and E). At the same time the University of California expressed an interest in the site for a marine sceicne laboratory. The controversy generated by these announcements and court actions which followed as PGandE exercised its right to eminent domain is described from the vantage point of personal participation. Sonoma County Harbor Commission and Sonoma County Commissioners remained relatively neutral. The conflict was characterized by a lack of information about geological conditions, offshore currents, and mixing patterns as they related to power plant thermal pollution. The marine science laboratory was built while the controversy over the power plant continued. By 1962 the Sierra Club and other conservationists were engaged in the battle against PG and E. Revelations of old rock fractures on the site and discovery of a complex faulting structure offshore together with awareness of earthquake danger and radiation leakage apparently played a part in the decision-making process. In 1964 AEC refused to grant a license to PGandE based on safety requirements. The site was later acquired as a part of the state park system. The significance of the controversy in terms of citizen participation and the problems involved in dealing with conservation and preservation issues are discussed. (Edwards-North Carolina)
W74-00738

POLICY PLAN FOR DEVELOPMENT OF LANSING'S WATERFRONT.
Waterfront Development Board, Lansing, Mich.
For primary bibliographic entry see Field 03D.
W74-00742

PROTECTING OUR WATER ENVIRONMENT.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 05G.
W74-00743

PRICKETT CREEK WATERSHED, WEST VIRGINIA (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04A.
W74-00860

A BILL TO AUTHORIZE THE ACQUISITION OF THE BIG CYPRESS NATIONAL FRESH WATER RESERVE.
For primary bibliographic entry see Field 06E.
W74-00865

FIVE YEAR EXTENSION FOR RESEARCH AND DEVELOPMENT, PUBLIC LAW 92-60 (FINAL ENVIRONMENTAL STATEMENT).
Office of Saline Water, Washington, D.C.
For primary bibliographic entry see Field 03A.
W74-00876

LEVEE UNIT NO. L-246, MISSOURI RIVER LEVEE SYSTEM (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 04A.
W74-00879

LOST CREEK WATERSHED, NEWTON COUNTY, MISSOURI (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-00880

GILLHAM LAKE, COSSATOT RIVER ARKANSAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 04A.
W74-00881

GILLHAM LAKE, COSSATOT RIVER, ARKANSAS, APPENDIX II (PHOTOGRAPHS), APPENDIX III (ENVIRONMENTAL ELEMENTS), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 04A.
W74-00882

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX C, THE BAY--PROCESSES AND RESOURCES, VOLUME II.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00891

ECOLOGICAL AND ENVIRONMENTAL CONSIDERATIONS,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 08A.
W74-01060

07. RESOURCES DATA

7A. Network Design

NEEDS AND USES FOR A GROUND WATER QUALITY DATA SYSTEM,
Minnesota Univ., St. Paul. Agricultural Extension Service.
L. Hanson.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 102-105, February 1973. 5 ref. 14-31-0001-3823.

Descriptors: *Data collections, *Hydrologic data, *Minnesota, Network design, Planning, Water management (Applied), Water quality, Water pollution, Monitoring, Warning systems.

The major objective of Minnesota's proposed groundwater quality information system is to provide an early warning system to alert State agencies with responsibility for management of this resource of future problems. This is extremely important because of the long-time frame involved in groundwater movement. Surface contamination may effectively destroy a water supply or make necessary expensive treatment processes for the affected communities. The investment of a modest amount of State resources to develop such a system would essentially be an inexpensive insurance policy designed to protect a State resource worth billions of dollars. Priority objectives for the information system are early warning of deterioration of groundwater quality for responsible governmental agencies; providing base line information on natural or present water quality; providing guide for land use planning and land use controls as related to groundwater quality; providing a basis for educational programs on groundwater resources; providing service to individuals, engineers, water well contractors and local government regarding best well locations and formations for water supply; and providing scientific and technical data for a variety of uses such as tracing of groundwater movement and prospecting for other economic resources. (See also W73-09113) (Knapp-USGS)
W74-00573

WATER WELL RECORDS AND INFORMATION SYSTEM NEEDS,
Minnesota Dept. of Health, Minneapolis. Div. of Environmental Health.
For primary bibliographic entry see Field 07C.
W74-00574

SAMPLING FOR WASTE WATER ANALYZERS. PART I: SYSTEMATIC APPROACH,
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 05A.
W74-00642

SAMPLING FOR WASTE WATER ANALYZERS. PART II: EFFECTIVE APPLICATIONS,
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 05A.
W74-00643

7B. Data Acquisition

DIFFERENTIAL COUNTING IN MIXED CULTURES WITH COULTER COUNTERS,
Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Science.
For primary bibliographic entry see Field 05A.
W74-00614

MONITORING OF DUMPING BY MEANS OF SATELLITE REMOTE SENSING,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 05B.
W74-00635

REMOTE SENSING OF OIL SLICKS,
For primary bibliographic entry see Field 05A.
W74-00638

SAMPLING FOR WASTE WATER ANALYZERS. PART I: SYSTEMATIC APPROACH,
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 05A.
W74-00642

SAMPLING FOR WASTE WATER ANALYZERS. PART II: EFFECTIVE APPLICATIONS,
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 05A.
W74-00643

A CENTRIFUGAL TENSILE TESTER FOR SNOW,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02C.
W74-00682

THE ROCKY MOUNTAIN MILLIVOLT INTEGRATOR FOR USE WITH SOLAR RADIATION SENSORS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02D.
W74-00690

PHOTOGRAMMETRIC DETERMINATIONS OF SNOW COVER EXTENT FROM UNCONTROLLED AERIAL PHOTOGRAPHS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00697

COMPARISON OF FIELD METHODS FOR MEASURING STREAM DISCHARGE,
New York State Dept. of Environmental Conservation, Delmar. Wildlife Research Lab.
For primary bibliographic entry see Field 02E.
W74-00735

PROPOSAL OF A SIMPLIFIED MANOMETRIC METHOD FOR MEASURING BIOCHEMICAL OXYGEN DEMAND -- RESULTS AND PROBLEMS (VORSCHLAG EINER VEREINFACHTEN MANOMETRISCHEN METHODE ZUR MESSUNG DES BIOCHEMISCHEN SAUERSTOFFBEDARFS -- ERGEBNISSE UND P ROBLEME),
Institut fuer Zellstoff und Papier, Heidenau (East Germany).
For primary bibliographic entry see Field 05A.
W74-00782

ADSORPTIVE EXTRACTION FOR ANALYSIS OF COPPER IN SEAWATER,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 02K.
W74-00827

POSSIBILITIES OF USING GEOPHYSICAL METHODS IN A STUDY OF FRESHWATER DISCHARGES IN LITTORAL ZONES OF SEAS (O VOZMOZHNOSTYAKH GEOFIZICHESKIKH METODOV PRI IZUCHENII RAZGRUZOK PRESNYKH VOD V PRIBREZHNYKH ZONAKH MOREY),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 02F.
W74-00847

A COMPILATION OF STUDIES FROM ATMOSPHERIC VARIABILITY EXPERIMENT (AVE),
Texas A and M Univ., College Station. Dept. of Meteorology.
For primary bibliographic entry see Field 02B.
W74-00851

SOME SIMPLE METHODS FOR LIMNOLOGICAL STUDY IN SHALLOW WATER,
Institut Royal des Sciences Naturelles de Belgique, Brussels.
G. Marlier, G. Gallez, G. Hachez, and C. Wattiez.
Bull Inst R Sci Nat Belg Biol, Vol 48, No 5, p 1-11, 1972, Illus, English summary.
Identifiers: Dredges, Limnological studies, Methods, Nets, *Productivity (Plankton), *Plankton sampler, *Sampling (Shallow-water).

A simple plankton sampler is described which avoids the drawback of clogging of nets. It is used in shallow waters of ponds during studies on productivity. Another type of plankton sampler made of a narrow net is also depicted, the features of which are also intended to avoid clogging. It is used under the same conditions and gives comparable results to the first device. Then, 2 methods are proposed for splitting plankton samples not large enough for using the commercially available plankton-splitters. Lastly, a small quantitative dredge for benthic organisms to be used in shallow ponds or littoral waters, is described.--Copyright 1973, Biological Abstracts, Inc.
W74-00998

COMPARISON OF 2 METHODS OF TREATING WATER SAMPLES ('ACTUAL IN SITU' AND 'SIMULATED IN SITU') FOR STUDY OF PRIMARY PRODUCTION BY THE CARBON 14 TECHNIQUE (IN FRENCH),
M. Angot.
Cah O R S T O M (Off Rech Sci Tech Outre-Mer) Ser Oceanogr, Vol 10, No 1, p 71-73, 1972, English summary.
Identifiers: *Carbon-14 technique, *Madagascar (Nosy Be), *Primary production, Samples, Measurement.

Primary production measurements were carried out in Nose Be (Madagascar) by the 14C technique. Statistical tests show that the results obtained by 'in situ' and 'in situ simulated' are the same.--Copyright 1973, Biological Abstracts, Inc.
W74-01004

CONCERNING A NEW GRAPHIC METHOD FOR STUDY OF NATURAL WATERS (IN FRENCH),
Institut National des Sciences Appliquees, Toulouse (France).
For primary bibliographic entry see Field 02K.
W74-01008

TIME-TABLES AS A METHOD TO RECORD CHANGES IN PLANKTON COMPOSITION,
Research and Advisory Inst. for Field Crop and Grassland Husbandry, Wageningen (Netherlands).
B. J. Hoogers, and H. G. Van Der Weij.
Inst Biol Scheik Onderz Landbouwgewassen Wageningen Meded, 451, p 19-27, 1971.
Identifiers: Plankton data, Records, *Time tables, Methodology, *Phytoplankton, *Zooplankton.

In 1967 Hoogers introduced the use of time-tables to record the development throughout the year of ditch vegetations. A method is introduced to record in a similar way the composition of phytoplankton and zooplankton. Of the phytoplankton and zooplankton samples that are taken at regular intervals the numbers of specimens of individual species observed in 100 optical fields are expressed in scale values and introduced on a time scale. The method is demonstrated by means of data obtained in a fertilization experiment.--Copyright 1973, Biological Abstracts, Inc.
W74-01010

EVALUATION OF A REMOVAL METHOD FOR ESTIMATING THE NUMBERS OF ROCK POOL CORIXIDS (HEMIPTERA, CORIXIDAE),
Helsinki Univ. (Finland). Dept. of Zoology.
V. I. Pajunen.
Ann Zool Fenn. Vol 9, No 3, p 152-155. 1972.
Identifiers: Corixidae, *Corixids, Hemiptera, Heteroptera, Methodology, *Rock pools, *Nets.

The numbers of larval and adult corixids in small rock pools were estimated by a removal method. Standardized net sweeps were used as units of catch, each removing 8-20% of the numbers remaining; the total catch comprised 50-85% of the total numbers. Estimates based directly on daily catches varied greatly, but acceptable results were obtained by using parameters estimated from pooled data of 3 yr. Significant differences in catchability were found between earlier and later developmental stages. By pooling the information for different stages and for different rock pools, 95% confidence limits differing by 10-50% from point estimates of total numbers were obtained.--Copyright 1973, Biological Abstracts, Inc.
W74-01055

WATER QUALITY ASSESSMENT PRACTICE IN AUSTRALIA,
Melbourne Water Science Inst. (Australia).
For primary bibliographic entry see Field 02K.
W74-01089

7C. Evaluation, Processing and Publication

TRAVEL TIME OF GEORGIA STREAMS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 04A.
W74-00556

GROUND WATER, A RESOURCE TO BE PROTECTED,
Minnesota Dept. of Natural Resources, St. Paul.
For primary bibliographic entry see Field 05B.
W74-00566

NEEDS AND USES FOR A GROUND WATER QUALITY DATA SYSTEM,
Minnesota Univ., St. Paul. Agricultural Extension Service.
For primary bibliographic entry see Field 07A.
W74-00573

WATER WELL RECORDS AND INFORMATION SYSTEM NEEDS,
Minnesota Dept. of Health, Minneapolis. Div. of Environmental Health.
E. H. Ross.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 106-124, February 1973. 10 fig, 2 tab. 14-31-0001-3823.

Descriptors: *Water quality, *Groundwater, *Data collections, *Monitoring, *Minnesota, Sampling, Well data, Water wells, Planning.

In Minnesota, standards are established for the design, location, and construction of water wells within the State. The driller is required to submit well record information on each well drilled which includes data on geology, water quality and quantity, construction methods, and equipment. State Health Department laboratory staff performs chemical and biological analyses on water samples. The Department of Natural Resources uses the data for furthering their information on location and distribution of groundwater resources and their allocation. The Geological Survey uses the data for refinement of the geological mapping of the State. The Health Department uses the data to assist in evaluating the degree to which the water well contractors are complying with the provisions of the law for licensing and regulation and more specifically for compliance with the regulations on standards for well construction. (See also W73-09113) (Knapp-USGS)
W74-00574

SUBSURFACE GEOLOGIC INFORMATION SYSTEM IN MINNESOTA: A STATUS REPORT,
Geological Survey, Minneapolis, Minn.
G. B. Morey.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information Systems and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 125-141, February 1973. 8 fig, 2 tab, 4 ref. 14-31-0001-3823.

Descriptors: *Data storage and retrieval, *Data collections, *Minnesota, *Hydrologic data, Geology, Hydrogeology, Data processing.

An efficient data storage and retrieval system was established in Minnesota for geologic information. The Minnesota Geological Survey maintains a central file for the State by storing it in a digital computer system capable of printing out data as required. The well log data includes name, age, depth to top, and thickness of each lithologic unit encountered; and a description of each unit, including bedding characteristics, color, grainsize, sorting and other characteristic textures, type and amount of cement, porosity, permeability, and mineral composition. The system is capable of retrieving data in several ways. A printout summarizes data from one drill hole, or a printout summarizing all available data is available. Specific data may be obtained for a specific area. The computer, interfaced with various automatic plotters, will provide data in an interpretable form, such as contour maps or graphs, directly to the user. (See also W73-09113) (Knapp-USGS)
W74-00575

GROUND WATER QUALITY INFORMATION SYSTEMS - EXPERIENCES IN OTHER STATES,
Minnesota Univ., Minneapolis. School of Public Health.
C. P. Straub.

In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 142-180, February 1973. 1 tab, 2 append. 14-31-0001-3823.

Descriptors: *Data storage and retrieval, *Data collections, *Hydrologic data, Geology, Hydrogeology, Data processing.

Information on State systems for the collection and retrieval of groundwater data was requested from the 50 States, Puerto Rico, and the Virgin Islands. In response to the initial enquiry, replies were received from 45 States and two territories. Only 10 States reported that they had automated data collection and retrieval systems or that such systems were under development. Three of these states were geared solely to the collection of water-resources information. Five states had cooperative collection and retrieval systems with the U.S. Geological Survey. A number of states indicated that a manual collection and data retrieval system was being used based on data files maintained over a considerable period of time. The data available on existing information systems, the analytical services available for characterizing the quality parameters of the water supplies, and other information are listed. There is no single agency in state government that is basically responsible for the collection and dissemination of data on groundwater quality. (See also W73-09113) (Knapp-USGS)
W74-00576

UTAH'S GROUND WATER QUALITY INFORMATION SYSTEM,
Utah State Div. of Health, Salt Lake City.
L. M. Thatcher.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 181-190, February 1973. 4 fig. 14-31-0001-3823.

Descriptors: *Utah, *Data storage and retrieval, *Hydrologic data, *Groundwater, Well data, Data processing, Water quality, Water management (Applied).

In Utah, environmental quality matters are within the Division of Health, with policy guidance of three statutory bodies: The State Board of Health, State Air Conservation Committee, and State Water Pollution Committee. Computerized inventories of water pollution sources and similar inventories of municipal water supplies are in use. Including quality and quantity characteristics of all individual sources contributing to these supplies will greatly enhance the value of computer records. Present procedure also includes publishing annually all chemical and radiological laboratory analysis information in chronological tabulation. Bacteriological analyses performed primarily on some 335 municipal supplies, and not identified as to source, are tabulated for each municipality on an annual basis to determine compliance with drinking water standards. A few separate groundwater sources may be monitored for coliforms if chlorination is depended on for purification and if there is some question about level of pollution. (See also W73-09113) (Knapp-USGS)
W74-00577

FEDERAL WATER INFORMATION SYSTEMS,
Geological Survey, Washington, D.C. Office of Water Data Coordination.
W. W. Doyel.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 191-209, February 1973. 8 fig, 18 ref. 14-31-0001-3823.

Descriptors: *Information exchange, *Data storage and retrieval, *Information retrieval, Data collections, Hydrologic data, Environment, Documentation, Networks, Land use, Planning, Management.

Systems are being developed to give information on the environment and assist in putting together all the facts and figures for proper decisionmaking. The National Water Data Exchange (NAWDEX) is an example of a decentralized system. Collector agencies act as ongoing data centers with little, if any, change in operating procedures. A combination of centralized and decentralized approaches is exemplified by the Resources and Land Information program (RALI) being developed within the Department of the Interior. This program will provide (1) a broad data acquistion capability; (2) a National Information System Network utilizing libraries as well as computer systems; and (3) interpretation, analysis, and translation of the data into products that are applicable by the user. The RALI program will operate with a national center in the Washington, D.C. area, regional centers, and links to state and local centers. The Geological Survey established the Office of Data Coordination (OWDC) in its Water Resources Division to carry out the coordinating, planning, and cataloging functions, to complement its function of data acquisition. The principal functions are: to design and operate a national network for acquiring water data; to organize the network data; to coordinate national network and specialized water data activities; to prepare an annual Federal Plan for acquisition of water data; and to maintain a central catalog of information. (See also W73-09113) (Knapp-USGS)
W74-00578

RELATION OF GROUND WATER QUALITY INFORMATION SYSTEM AND OTHER SYSTEMS IN MINNESOTA,
Minnesota State Planning Agency, St. Paul.
D. Hamernick.
In: Proceedings of Conference on Toward A Statewide Ground Water Quality Information System and Report of Ground Water Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council: University of Minnesota Water Resources Research Center Mimeographed Report, p 211-216, February 1973. 3 ref. 14-31-0001-3823.

Descriptors: *Information exchange, *Data storage and retrieval, *Minnesota, *Information retrieval, Data collections, Hydrologic data, Environment, Documentation, Networks, Land use, Planning, Management.

Several information systems are presently being developed by State agencies in Minnesota. The Minnesota Pollution Control Agency initiated data systems for river and air quality data and has access to a Federal system, STORET. The State Department of Health computerizes statistics of the past decade and has a system for dealing with municipal water quality data. The Minnesota State Planning Agency is sponsoring a data bank for land-use information and has completed a lakeshore inventory. To assure maximum compatibility between these systems, overall coordination through a central agency is necessary. The primary goal of the Minnesota Land Management Information System (MLMIS) Project is to improve the quality of public- and private-sector decisions about the environment. MLMIS is doing this by providing extensive information, previously unavailable, on present land use and economic and social conditions. This means combining in compatible computer systems a broad range of data now collected routinely and maintained separately by government agencies in their regular licensing, regulating, and management functions. (See also W73-09113) (Knapp-USGS)
W74-00579

RIVER MILE INDEX--NAPA, SALINAS, AND EEL RIVER BASINS, CALIFORNIA.
Federal Power Commission, San Francisco, Calif. Regional Office.
For primary bibliographic entry see Field 02E.
W74-00585

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 9. COLORADO RIVER BASIN--VOLUME 2. COLORADO RIVER BASIN FROM GREEN RIVER TO COMPACT POINT.
Geological Survey, Washington, D.C.

Available from GPO, Washington, D.C., 20402 Price $3.20. Water-Supply Paper 2125, 1973. 634 p, 1 fig.

Descriptors: *Streamflow, *Flow measurement, *Hydrologic data, *Surface waters, *Colorado River basin, Basic data collections, Arizona, Colorado, New Mexico, Utah, Wyoming, Gaging stations, Flow rates, Average flow, Low flow, Peak discharge, Stream gages, Lakes, Reservoirs, Water levels, Crest-stage gages.
Identifiers: *Colorado River Basin (Wyo to N Mex).

This volume of surface water data for the Colorado River basin from Green River to Compact Point is one of a series of 37 reports presenting records of stage, discharge, and content of streams, lakes, and reservoirs in the United States during the 1966-70 water years. The tables of data include a description of the gaging station, and daily, monthly, and yearly discharges of the stream. The description of the station gives the location, drainage area, records available, type and history of gage, average discharge, extremes of discharge, and general remarks. For most gaging stations on lakes and reservoirs a description of the station and a monthly summary table of stage and contents are given. Data for partial-record stations include measurements at low-flow partial-record stations and annual maximum stage and discharge at crest-stage stations. (Woodard-USGS)
W74-00586

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS--VOL 3. UPPER MISSISSIPPI RIVER BASIN BELOW KEOKUK, IOWA.
Geological Survey, Washington, D.C.

Available from GPO, Washington, D.C. 20402 Price $3.20. Water-Supply Paper 2115, 1973. 607 p, 1 fig.

Descriptors: *Streamflow, *Flow measurement, *Hydrologic data, *Surface waters, *Mississippi River basin, Basic data collections, Illinois, Indiana, Iowa, Minnesota, Missouri, Wisconsin, Gaging stations, Flow rates, Average flow, Low flow, Peak discharge, Stream gages, Crest-stage gages, Water levels, Lakes, Reservoirs.
Identifiers: *Upper Mississippi River Basin.

This volume of surface water data for the Upper Mississippi River basin below Keokuk, Iowa is one of a series of 37 reports presenting records of stage, discharge, and content of streams, lakes, and reservoirs in the United States during the 1966-70 water years. The tables of data include a description of the gaging station, and daily, monthly, and yearly discharges of the stream. The

description of the station gives the location, drainage area, records available, type and history of gage, average discharge, extremes of discharge, and general remarks. For most gaging stations on lakes and reservoirs a description of the station and a montly summary table of stage and contents are given. Data for partial-record stations include measurements at low-flow partial-record stations and annual maximum stage and discharge at crest-stage stations. (Woodard-USGS)
W74-00587

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 3. OHIO RIVER BASIN--VOLUME 4. OHIO RIVER BASIN BELOW WABASH RIVER.
Geological Survey, Washington, D.C.

Available from GPO, Washington, D.C., 20402 Price $3.70. Water-Supply Paper 2110, 1973. 806 p, 1 fig.

Descriptors: *Streamflow, *Flow measurement, *Hydrologic data, *Surface waters, *Ohio River, Basic data collections, Tributaries, Alabama, Georgia, Illinois, Kentucky, North Carolina, Tennessee, Virginia, Gaging stations, Flow rates, Lakes, Reservoirs, Water levels, Average flow, Low flow, Peak discharge, Stream gages, Crest-stage gages.

This volume of surface water data for Ohio River basin below Wabash River is one of a series of 37 reports presenting records of stage, discharge, and content of streams, lakes and reservoirs in the United States during the 1966-70 water years. The tables of data include a description of the gaging station, and daily, monthly, and yearly discharges of the stream. The description of the station gives the location, drainage area, records available, type and history of gage, average discharge, extremes of discharge, and general remarks. For most gaging stations on lakes and reservoirs a description of the station and a montly summary table of stage and contents are given. Data for partial-record stations include measurements at low-flow partial-record stations and annual maximum stage and discharge at crest-stage stations. (Woodard-USGS)
W74-00588

STREAMFLOW FORMATION, COMPUTATIONS, AND REGULATION (FORMIROVANIYE, RASCHETY I REGULIROVANIYE RECHNOGO STOKA).
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 04A.
W74-00592

PROBLEM OF SIMPLIFYING SNOWMELT COMPUTATIONS (K VOPROSU OB UPROSHCHENNOM RASCHETE SNEGOTAYANIYA),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02C.
W74-00596

SOME ASPECTS OF NONORTHOGONAL DATA ANALYSIS, PART II. COMPARISON OF MEANS,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del.
R. D. Snee.
Journal of Quality Technology, Vol 5, No 3, p 109-119, July 1973. 3 fig, 8 tab.

Descriptors: *Regression analysis, Statistical methods, *Data processing.
Identifiers: *Analysis of covariance, *Missing data, *Comparison of means, Unequal replicates, Multiple regression.

Since the effects of factors and their interactions cannot be evaluated by the ususal analysis of variance technique when there are unequal replicates of missing data, alternative methods are required. The use of multiple regression in the analysis of this type of data and analysis of covariance problems is discussed. Suggested procedures are illustrated. (Little-Battelle)
W74-00612

ESTIMATING A CORRELATION COEFFICIENT WHEN ONE VARIABLE IS NOT DIRECTLY OBSERVED,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Statistics.
L. S. Mayer.
Journal of the American Statistical Association, Vol 68, No 342, p 420-421, June 1973. 1 tab, 9 ref.

Descriptors: *Correlation analysis, Statistical methods.
Identifiers: *Correlation coefficients, *Monotonic transforms.

A simple method is presented for estimating the correlation between two bivariate normal variables when one variable is directly observed and a montonic transform of the other variable is observed. The concept of best monotone regression is defined and a monotone correlation coefficient is introduced. It is shown that this coefficient is a consistent estimator of the true correlation between the two bivariate normal random variables. An application is presented. (Little-Battelle)
W74-00619

A SYSTEMATIC APPROACH TO THE ANALYSIS OF MEANS. PART I. ANALYSIS OF TREATMENT EFFECTS,
General Electric Co., Cleveland, Ohio.
E. G. Schilling.
Journal of Quality Technology, Vol 5, No 3, p 93-108, July 1973. 7 fig, 13 tab, 15 ref, 2 append.

Descriptors: *Statistical models, Data processing, Statistical methods.
Identifiers: *Data interpretation, *Analysis of means, Treatment effects, Algorithms, Crossed design, Incomplete block design, Nested design, Split-plot design, Experimental design.

The analysis of means is a method for the graphical analysis of the means resulting from a designed experiment. The basic procedure, which was developed by E. R. Ott of Rutgers University, has been extended. This part of the series provides an algorithm to simplify application of analysis of means, extends the analysis from the present crossed-fixed effects designs to other forms such as balanced incomplete blocks, and discussed the role of random factors. Several examples are included. (Little-Battelle)
W74-00626

SKIP-LOT SAMPLING PLANS,
Procter and Gamble Co., Cincinnati, Ohio.
R. L. Perry.
Journal of Quality Technology, Vol 5, No 3, p 123-130, July 1973. 4 fig, 2 tab, 7 ref.

Descriptors: *Quality control, *Inspection, Sampling, Statistical methods, Data processing.
Identifiers: *Skip-lot sampling, *Acceptance sampling, *Average sample number, Data interpretation, Average outgoing quality limit.

A system is presented of skip-lot sampling plans for lot-inspection where provision is made for skipping inspection of some of the lots when the quality of the submitted product is good. The operating characteristic properties are presented, as well as the plan's Average Sample Number (ASN), its response-to-change characteristics, and a measure of the Average Outgoing Quality Limit (AOQL) in terms of 'nonconforming' lots. (Little-Battelle)
W74-00627

ALTERNATING CURRENT POLAROGRAPHY IN THE HARMONIC MULTIPLEX MODE. OBSERVATIONS ON THE USE OF DIGITAL SIGNAL CONDITIONING WITH THE FAST FOURIER TRANSFORM ALGORITHM,
Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
D. E. Gover, and D. E. Smith.
Analytical Chemistry, Vol 45, No 11, p 1869-1877, September 1973. 7 fig, 25 ref.

Descriptors: *Fourier analysis, *Instrumentation, *Data processing, Polarographic analysis, Efficiencies, Methodology, Data collections, Measurement, Cadmium, Zeta potential, Automatic control, Algorithms.
Identifiers: *AC polarography, *Fast Fourier transformation, Digital signal conditioning, *Data acquisition, Harmonic multiplex mode, Analog to digital converters, Chromic cyanide, Minicomputers.

Digital signal conditioning based on the Fast Fourier Transformation (FFT) is applied to ac polarography in the harmonic multiplex mode. The FFT is used in two capacities. First, it is applied to the discrete, digital representation of the cell current time domain waveform, which is obtained by analog-to-digital conversion. Through this operation, the digital FFT provides the means for separation and quantitative characterization of the direct current, fundamental harmonic alternating current, and second harmonic alternating current polarographic responses. Second, polarograms resulting from measurement of the response as a function of the dc potential are smoothed by a FFT smoothing technique. Results show that the foregoing digital signal conditioning scheme provides at least comparable measurement fidelity, together with superior efficiency and convenience, compared with a previously-described procedure which relies more heavily on analog signal conditioning. (Holoman-Battelle)
W74-00631

THE USE OF MINI COMPUTERS IN THE WATER INDUSTRY,
Kent Instruments Ltd., Luton (England).
B. L. Thurley.
Water and Water Engineering, Vol 77, No 927, p 165-169, May 1973. 3 fig.

Descriptors: *Control systems, *Automatic control, Computers, Data processing.
Identifiers: *Minicomputers.

Two minicomputers which are used in the water industry, the DEC PDP/8 and the MINIC are described, with brief comments on interfaces, peripherals, displays, and types of applications used and anticipated. Four separate installations using minicomputers in different modes are also described. (Little-Battelle)
W74-00666

PATHOLOGY OF A DYNAMIC PROGRAMING SEQUENCING ALGORITHM,
Northwestern Univ., Evanston, Ill. Dept. of Industrial Engineering and Management Sciences.
For primary bibliographic entry see Field 06A.
W74-00671

ANNUAL STREAMFLOW SUMMARIES FROM FOUR SUBALPINE WATERSHEDS IN COLORADO,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 03B.
W74-00676

MICHIGAN WATER RESOURCES ENFORCEMENT AND INFORMATION SYSTEM,
Michigan Dept. of Natural Resources, Lansing. Water Resources Commission.
For primary bibliographic entry see Field 05G.
W74-00701

GROUNDWATER SURVEY OF THE ERBIL PROJECT AREA,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 04B.
W74-00761

FLOOD MANAGEMENT PLAN--WARNING, DAMAGE, COORDINATION.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 06F.
W74-00817

HEC-1, FLOOD HYDROGRAPH PACKAGE--USERS MANUAL, COMPUTER PROGRAM 723-X6-L2010.
Hydrologic Engineering Center, Davis, Calif.

January 1973. 186 p.

Descriptors: *Flood discharge, *Synthetic hydrology, *Systems analysis, *Computer models, *Computer programs, Input-output analysis, Methodology, Hydrographs, Hydrologic data, Forecasting, Statistical methods, Computers, Flood routing, Rainfall-runoff relationships, Flood damage, Watersheds (Basins).
Identifiers: Fortran IV.

This computer program represents a major revision of the October 1970 version of the Flood Hydrograph Package, HEC-1. The computational methods used by the program remain basically unchanged; however, the input and output formats have been almost completely restructured. These changes were made in order to simplify input requirements and to make the program output more meaningful and readable. The program is capable of performing five major types of flood hydrograph analyses: (1) optimization of routing parameters; (2) optimization of unit hydrograph and loss rate parameters; (3) generalized precipitation, runoff, routing and combining operations to simulate the hydrologic response of a watershed and its stream network; (4) stream system computations for specified precipitation depth-area storm relationships for the entire watershed or region; and (5) specialized precipitation streamflow network simulation relative to multiple floods for multiple plans of basin development and the economic analysis of flood damages. This version of the Flood Hydrograph Package has been developed and tested primarily on the UNIVAC 1108 and the Control Data Corporation 6600 computer systems. It was then adapted for use of the GE 400 series computers. (Woodard-USGS)
W74-00821

COMPUTER PROGRAM 723-X6-L202A, HEC-2, WATER SURFACE PROFILES--USERS MANUAL.
Hydrologic Engineering Center, Davis, Calif.

February 1972. 134 p.

Descriptors: *Streamflow forecasting, *Flood forecasting, *Systems analysis, *Computer programs, *Synthetic hydrology, Flood profiles, Computers, Computer models, Methodology, Environmental effects, Engineering structures, Hydraulic structures, Bridges, Culverts, Weirs, Embankments, Dams, Flood control.
Identifiers: Fortran IV.

This computer program (723-X6-L202A) is a modification of program 723-G2-L214A (first issue dated December 1968) developed in The Hydrologic Engineering Center. The program computes and plots (by printer) the water surface profile for river channels of any cross section for either subcritical or supercritical flow conditions. The effects of various hydraulic structures such as bridges, culverts, weirs, embankments, and dams may be considered in the computation. The principal use of the program is for determining profiles for various frequency floods for both natural and modified conditions. The latter may include channel improvements, levees and floodways. Input may be in either English or Metric units. The program was written for use in the CDC 6600 computer but may be used with minor modifications on other high-speed computers having four or more magnetic tapes plus input and output units such as the IBM 360, IBM 7094, and GE 437. Various versions of the original program 723-G2-L214A can be used on smaller computers such as the IBM 1620, GE 225, and IBM 1130. (See also W74-00823) (Woodard-USGS)
W74-00822

COMPUTER PROGRAM 723-X6-L202A, HEC-2, WATER SURFACE PROFILES--PROGRAMMERS MANUAL.
Hydrologic Engineering Center, Davis, Calif.

June 1973. 188 p, 7 fig, 4 tab.

Descriptors: *Streamflow forecasting, *Flood forecasting, *Systems analysis, *Computer programs, *Synthetic hydrology, Flood profiles, Computers, Computer models, Methodology, Environmental effects, Engineering structures, Hydraulic structures, Bridges, Culverts, Weirs, Embankments, Dams, Flood control.
Identifiers: Fortran IV.

This computer program (723-X6-L202A) is a modification of the 1964-1968 (first publication dated 1968) versions of program 723-G2-L214A (formerly 22-J2-L212), developed in the Hydrologic Engineering Center. The program computes and plots (by printer) the water surface profile for river channels of any cross section for either subcritical or supercritical flow conditions. The effects of various hydraulic structures such as bridges, culverts, weirs, embankments, and dams may be considered in the computation. The principal use of the program is for determining profiles for various frequency floods for both natural and modified conditions. The latter may include channel improvements, levees and floodways. Input may be in either English or Metric units. A supplementary program (723-G1-L202B) is available to convert input data prepared for the older program 723-G2-L214A for use in the new program. A data edit program (723-G1-L202C) which reads the data cards for the new program 723-X6-L202A and checks the data for various input errors is also available. The program was written for use on various high-speed computers having four or more magnetic tapes, plus input and output units, such as the IBM 360/50, UNIVAC 1108, GE 437, and CDC 6600. Various versions of the original program 723-G2-L214A can be used on smaller computers such as the IBM 1620, Ge 225, and IBM 1130. (See also W74-00822) (Woodard-USGS)
W74-00823

WATER RESOURCES DATA FOR NEW YORK, 1972: PART 1. SURFACE WATER RECORDS.
Geological Survey, Albany, N.Y.

Basic Data report, 1973. 313 p, 14 fig, 3 ref.

Descriptors: *Water resources, *Surface waters, *New York, *Streamflow, *Flow measurement, Flow rates, Hydrologic data, Basic data collections, Gaging stations, Stream gages, Water yield, Lakes, Reservoirs, Water levels, Elevation, Inflow, Discharge (Water), Crest-stage gages.
Identifiers: *Surface water records (NY).

Surface-water records for the 1972 water year are presented for New York, including records of streamflow, reservoir storage or lake elevations at gaging stations, partial record stations, and miscellaneous sites. Records for a few pertinent gaging stations in bordering states are also included. These data represent that portion of the National Water Data System collected by the U. S. Geological Survey and cooperating state and federal agencies in New York. The tables of data include daily discharge records for 206 gaging stations; daily or monthly data on stage or contents for 44 lakes and reservoirs; discharge measurements for 434 sites, 188 of which are low-flow, partial-record stations and the remainder, miscellaneous sites; and annual maximum stages and discharges for 123 crest-stage, partial-record stations. (Woodard-USGS)
W74-00825

ESTUARIES, BAYS AND COASTAL CURRENTS AROUND PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
E. F. Colon.
Available from the National Technical Information Service as PB-224 871, $3.00 in paper copy, $1.45 in microfiche. Partial Completion Report No. 8 (UPRICO-WRRI-PR-71-31-8), May 1972. 40 p. OWRR A-031-PR (8).

Descriptors: *Currents (Water), Coasts, *Ocean currents, *Bays, *Estuaries, *Puerto Rico, Data collections, Measurement, Instrumentation.

Three model 502 In-situ Current direction, temperature, and velocity meters, manufactured by Hydro Products in California were used simultaneously in a triangular pattern or in line. In some cases, all three instruments were used vertically at different depths. A one half moon cycle period was taken for each station and a continuous recording was obtained for all three instruments. This data is shown by vectors every 10 degrees on a magnetic rose and in tabular form indicating the relative volume of water passing through the station every 10 degrees during the entire study period.
W74-00832

REGIONAL POLLUTION STUDY: INVENTORY AND ANALYSIS.
Tulsa City-County Health Dept., Okla. Environmental Health Div.
For primary bibliographic entry see Field 05B.
W74-00849

OPTIMAL ALLOCATION OF ARTIFICIAL AERATION ALONG A POLLUTED STREAM USING DYNAMIC PROGRAMMING,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 05G.
W74-00883

CHESAPEAKE BAY EXISTING CONDITIONS REPORT, APPENDIX D--MAP FOLIO.
Corps of Engineers, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W74-00924

DYNAMIC WATER QUALITY FORECASTING AND MANAGEMENT,
Manhattan Coll., Bronx, N.Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W74-00927

METHODS OF COLLECTING AND INTERPRETING GROUND-WATER DATA.
Geological Survey. Washington, D.C.

Geological Survey Water Supply Paper 1544-H, Compiled by R. Bentall. 1963, 97 p, 26 fig, 20 tab.

Descriptors: Groundwater resources, Drillers' logs, *Sampling, Logging (Recording), Observation wells, *Water level recorders, Water level fluctuations, Permeability, Induced infiltration, Artesian aquifers, Management, Ground water movement, Methodology.
Identifiers: Deep aquifers, Shallow aquifers, *Groundwater velocity, Groundwater temperature, Streambed percolation.

Six papers pertaining to widely differing phases of ground water investigation comprise this contribution. The first paper desceibes methods of collecting, examining, and describing rock cuttings and some of the uses made of subsurface information obtained by drilling. Equipment used and the procedure followed in installing shallow water-level observation wells by a combination of jetting and rotary-drilling methods is described in the second paper. The phenomenon of reverse water-level fluctuations is discussed in the third paper. The fourth paper relates the distribution of underground temperatures to the velocity of the ground water. Factors that should be considered in designing a water-supply installation that is to be supplied by stream bed percolation are discussed in the fifth paper. In the sixth paper a long-term record of water-level fluctuations in a single well is used as the basis for developing a water budget for the artesian aquifer tapped by the well. (Campbell-NWWA)
W74-00929

WHAT YOU SHOULD KNOW ABOUT PUMPING TESTS. TECHNICAL MEMO NO. 1,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 08G.
W74-00933

THE HARVARD PROGRAM: A SUMMING UP,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 06B.
W74-01030

STREAM AND LAKEFRONT FIELD INVENTORY, VOLUME I - SUMMARY.
Lorain County Regional Planning Commission, Elyria, Ohio.
For primary bibliographic entry see Field 05B.
W74-01046

SELECTED WATER-QUALITY RECORDS FOR TEXAS SURFACE WATERS, 1971 WATER YEAR,
Geological Survey, Austin, Tex.
J. A. Schulze, A. J. Dupuy, and E. McPherson.
Texas Water Development Board Report 176, August 1973. 268 p, 2 fig, 152 tab, 13 ref.

Descriptors: *Water quality, *Water analysis, *Texas, *Surface waters, *Chemical analysis, Inorganic compounds, Organic compounds, Nutrients, Biochemical oxygen demand, Dissolved oxygen, Pesticides, Water temperature, Basic data collections, Gaging stations, Streamflow, Flow rates.

Data collected by the U.S. Geological Survey from a network of daily and periodic chemical-quality stations on streams in Texas are presented for the 1971 year. The program is in cooperation with the Texas Water Development Board and other State, federal, and local agencies. To supplement the information being obtained on the inorganic quality of the surface-water resources, determinations of BOD, dissolved oxygen, selected nutrients, and pesticides were made at selected sites on streams throughout the State. Water-quality records are tabulated by station according to standard stream order, progressing downstream within each river basin and in clockwise river basin sequence beginning with the most northerly river basin. Records for stations on tributaries are listed between stations on the main stream in the order in which those tributaries enter the main stream. (Woodard-USGS).
W74-01086

HEC-4, MONTHLY STREAMFLOW SIMULATION, COMPUTER PROGRAM 723-X6-L2340.
Hydrologic Engineering Center, Davis, Calif.

Generalized Computer Program 723-340, February 1971. 97 p.

Descriptors: *Streamflow forecasting, *Flow rates, *Synthetic hydrology, *Systems analysis, *Computer models, Computer programs, Input-output analysis, Methodology, Monthly, Hydrologic data, Statistical methods.
Identifiers: Fortran IV.

This streamflow-simulation computer program was prepared in The Hydrologic Engineering Center, Corps of Engineers. The program will analyze monthly streamflows at a number of interrelated stations to determine their statistical characteristics and will generate a sequence of hypothetical streamflows of any desired length having those characteristics. It will reconstitute missing streamflows on the basis of concurrent flows observed at other locations and will obtain maximum and minimum quantities for each month and for specified durations in the recorded, reconstituted and generated flows. It also will use the generalized simulation model for generating monthly streamflows at ungaged locations based on regional studies. There are many options of using the program for various related purposes, and it can be used for other variables such as rainfall, evaporation, and water requirements, alone or in combination. This program requires a FORTRAN IV compiler, a random number generator, and a fairly large memory. (Woodard-USGS)
W74-01091

08. ENGINEERING WORKS

8A. Structures

ENGINEERING REPORT ON SPECIAL ASSESSMENT STORM SEWER DISTRICT FOR THE NORTHEAST INDUSTRIAL DISTRICT, CITY OF KANSAS CITY, MISSOURI.
Riddle Engineering, Inc., Kansas City, Mo.

Kansas City Department of Public Works, Kansas City, Missouri, June 9, 1972. 52 p, 10 fig, 8 tab, 8 append.

Descriptors: *Sewers, *Storm drains, *Separated sewers, *Urban drainage, Urbanization, Outfall sewers, Missouri, Costs, Construction costs, Ponding, Urban hydrology.
Identifiers: *Kansas City (Missouri).

The Northeast Industrial District of Kansas City, Missouri, is a rapidly developing area that is experiencing problems of flooding from urban drainage. The District covers 355 acres of flat river bottom land in the Missouri River bottoms. Although protected by flooding from the Missouri River by levees, the area has problems of street flooding due to an inadequate drainage system. No major flooding damages occur in the area, primarily because basements are either non-existent, or are protected by waterproofing. The study inventoried existing systems and outlined criteria and design schemes for improvements. It was recommended that a design storm of the 2-year frequency be used. Total costs for the system range from between $2.1 million and $6.6 million, with the recommended system costing $4.6 million. This plan includes an all-gravity collection system with discharge to the Missouri River. Such a plan would: improve the economic conditions of the area by reducing impediments to traffic, have the highest benefit-cost ratio, and be the easiest system to construct. Other recommendation include regrading of portions of the street and enforcement of local building codes to reduce flood damages. (Poertner)
W74-00802

PRELIMINARY STUDY FOR CENTRAL INDUSTRIAL DISTRICT SEWERS, DEPARTMENT OF PUBLIC WORKS, KANSAS CITY, MISSOURI.
Shafer, Kline and Warren, Kansas City, Mo.

Kansas City Department of Public Works, Kansas City, Missouri, 1972. 28 p, 4 fig, 2 tab.

Descriptors: *Sewers, *Separated sewers, *Storm drains, *Urban drainage, Urbanization, Pumping plants, Outfall sewers, Missouri, Costs, Construction costs, Sewerage, Urban hydrology, Ponding.
Identifiers: *Kansas City (Missouri).

The location and condition were studied of existing storm sewers in the Central Industrial District of Kansas City, Missouri, and recommendations were made for supplemental sewers. Supplemental sewers are needed to eliminate surcharging of the present system which has caused both surface and basement flooding. The existing sewers were primarily of sound construction, having been built in the late 1800's. Alignment and structural strength is still good. But many of the trunk sewers are constructed of stone or brick, and the coefficient of roughness is too high for efficient operation, today. In addition, the sewers are, in some places, almost level, while in their lower extremities they have excessive slope. The combined sewage is carried by gravity to pumping stations, where it is pumped to treatment plants during dry weather. By-passes of sewer flows at the pumping station discharge into the Kansas and Missouri Rivers during periods of surcharge. A four-phase program of construction costing a total of $5.3 million was recommended. A 10-year storm was chosen for design purposes and the Rational Formula was selected for making computation of stormwater runoff rates. (Poertner)
W74-00803

FLOOD STUDIES FOR SAFETY OF TVA NUCLEAR PLANTS: HYDROLOGIC AND EMBANKMENT BREACHING ANALYSIS,
Tennessee Valley Authority, Knoxville.
D. W. Newton, and M. W. Cripe.
Paper presented at American Society of Civil Engineers, National Water Resources Engineering Meeting, Washington, D.C., January 29 - February 2, 1973. 37 p, 12 fig, 2 tab, 12 ref.

Descriptors: *Nuclear power plants, *Flood forecasting, *Tennessee Valley Authority, *Safety, Dam failure, Probable maximum precipitation, Flood routing, Flood recurrence intervals, Flood protection, Maximum probable flood, Flood profiles, Flood damage.

Design standards for nuclear power plants contain provisions for plant safety for the maximum possible flood. This in turn requires accurate determination of maximum floods. A TVA nuclear power plant was analyzed for the maximum probable flood under a variety of flood-causing conditions. Flood levels were examined for conditions of upstream dam failure by embankment breaching or be seismic failure, under assumed conditions of the probable maximum precipitation creating the probable maximum flood. It was found that seismic failure of upstream dams would not cause the worst flood conditions. Breaching of a dam embankment, followed by total failure of the dam, would cause the worst possible flood. The rate of dam failure was computed by assuming that overflow had begun at a notch of a specified size. However, theories on overtopping of embankments are not well developed and some quantities had to be assumed for flood analysis. A rough probability

analysis was performed, and the probability of the conditions of dam failure under the probable maximum precipitation producing the probable maximum flood was estimated to be extremely remote. (Poertner)
W74-00805

INSTITUTIONAL IMPLICATIONS OF DEEP-WATER PORTS.
Institute for Water Resources (Army), Alexandria, Va.

Report, June 1973. 14 p.

Descriptors: *Harbors, *Engineering structures, *Design criteria, *Ships, Reviews, Rivers and Harbors Act, Water quality control, Dredging, Navigation, Oil industry, Oil spills, Economics, Planning, Administrative decisions, Federal Government.
Identifiers: *Deepwater ports.

Federal responsibility for planning, constructing, and maintaining harbor and channel depths, and responsibility for reviewing and issuing permits for non-Federal developments in navigable waters of the United States resides primarily with the Army Corps of Engineers. As a result, the Corps of Engineers is concerned with the recent and rapid increases in ship size and water depth requirements. The institute for Water Resources contracted with Robert R. Nathan Associates for a study of '... the institutional implications of planning, constructing and operating U.S. deep harbors...' in August 1972. The report was completed in June 1973. (Copies will be available from National Technical Information Service, Department of Commerce, Springfield, Virginia 22151.) This summary of the major findings and conclusions of the report was prepared to fill the immediate need of interested parties for information on the principal results of the study, particularly in the light of current attention to deepwater port problems by the Executive Branch, Congress, State and local governments, and the petroleum and related industries. (Woodard-USGS)
W74-00820

CONSIDERATION OF THE CHARACTER OF SURFACE-GROUNDWATER RELATIONSHIPS AND STREAMFLOW IN ESTIMATES OF YIELDS FROM INFILTRATION GALLERIES (UCHET KHARAKTERA SVYAZI PODZEMNYKH VOD S POVERKHNOSTNYMI I REZHIMA RECHNOGO STOKA PRI RASCHETAKH INF IL'TRATSIONNYKH VODOZABOROV),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
Ye. L. Minkin, and B. M. Zil'bershteyn.
Vodnyye Resursy, No 1, p 186-201, 1973. 6 fig, 4 tab, 5 ref.

Descriptors: *Infiltration galleries, *Infiltration, *Surface-groundwater relationships, *Streamflow, *Estimating, Rivers, Valleys, Channels, Water wells, Water levels, Drawdown, Aquifers, Model studies, Analog models, Unsteady flow, Equations, Water yield.
Identifiers: USSR.

New procedures are described for simple analytical computation of yields from horizontal conduits in river valleys. Allowance is made for surface runoff, possible changes in the character of surface-groundwater relationships, resistance of channel deposits to infiltration, and differences in infiltration properties of alluvium and bedrock comprising the valley sides. To check applicability of the working relations proposed, analog modeling was performed on the ABM MCM-1 equipped to simulate unsteady flow. Good agreement was obtained from a comparison of the results of analytical computations and modeling of 5 typical variants. (Josefson-USGS)
W74-00848

PROJECTS PROPOSED FOR INCLUSION IN OMNIBUS RIVER AND HARBOR AND FLOOD CONTROL LEGISLATION--1972.
For primary bibliographic entry see Field 06E.
W74-00872

LOST CREEK WATERSHED, NEWTON COUNTY, MISSOURI (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-00880

GILLHAM LAKE, COSSATOT RIVER ARKANSAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 04A.
W74-00881

GILLHAM LAKE, COSSATOT RIVER, ARKANSAS, APPENDIX II (PHOTOGRAPHS), APPENDIX III (ENVIRONMENTAL ELEMENTS), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 04A.
W74-00882

DESIGN OF SMALL DAMS.
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.

Available from GPO, Wash, D.C. 20402 on Bur. of Reclamation, Denver Federal Center, Denver, Colo. 80225, Atten: 922 Price $12.65. A Water Resources Technical Publication. 1973 (second edition). 816 p.

Descriptors: *Project planning, *Dams, *Reservoir design, *Dam design, Benefits, Cost-benefit analysis, Feasibility studies, Project feasibility, Dam construction, Hydraulics, Streamflow forecasting, Dam foundations, Ecology.
Identifiers: *Small dams.

Instructions, standards, and procedures are presented for use in the design of small dams. They are intended to serve primarily as a guide to safe practices for those concerned with the design of small dams in public works programs in the United States. The book will serve this purpose in three ways: (1) It will provide engineers with information and data necessary for the proper design of small dams, (2) it will provide specialized and highly technical knowledge concerning the design of small dams in a form that can be used readily by engineers who do not specialize in this field, and (3) it will simplify design procedures for small earthfill dams. Damete gravity, earthfill (rolled-type), and rockfill dams. Emphasis is placed on the design of rolled earthfill dams because they are the most common type. Simplified design methods are given to avoid the complex procedures and special investigations required for large dams or for unusual conditions. Adequate but not unduly conservative factors of safety are used in the simplified design methods. See also W74-01059 thru W74-01070) (Knapp-USGS)
W74-01058

PROJECT PLANNING,
Bureau of Reclamation, Denver, Colo. Div. of Project Investigations.
A. F. Johnson.
In: Design of Small Dams; A Water Resources Technical Publication, p 1-19, 1973 (second edition). 3 ref.

Descriptors: *Project planning, *Dams, *Reservoir design, *Dam design, Benefits, Cost-benefit analysis, Feasibility studies, Project feasibility, Dam construction, Hydraulics, Streamflow forecasting, Dam foundations, Ecology.
Identifiers: *Small dams.

The investigations and studies made for dams must be considered in relation to the function they perform in accomplishing the purposes of the project as a whole. Each project purpose and each increment of its size or scope must justify inclusion in the project by some appropriate measure of feasibility or justification which is usually related to the benefits it produces, the need it serves, or the investment it can repay with or without interest. Feasibility stidies of dams and reservoirs should always consider possible objections from a public health and nuisance standpoint. The environmental and ecological aspects of the project should be studied and provisions made to minimize any deleterious effects. (See also W74-01058) (Knapp-USGS)
W74-01059

ECOLOGICAL AND ENVIRONMENTAL CONSIDERATIONS,
Bureau of Reclamation, Denver, Colo.
E. A. Seaman, and L. W. Davidson.
In: Design of Small Dams; A Water Resotion, p 21-36, 1973 (second edition). 14 fig, 30 ref.

Descriptors: *Reservoir design, *Project planning, *Dams, Ecology, Recreation, Environment, *Environmental effects, Dam design.
Identifiers: Smal dams.

One of the most important aspects of dealing correctly and completely with the ecological and environmental impact of any structure is proper planning. If possible, an environmental team should be formed of representatives from groups who will be affected by the structure and experts from various scientific fields who can contribute their ideas and experience. The placement of a dam or canal within the environment should be done with due consideration of the effects on the fish and wildlife populations of the specific area. Provisions should be made to obtain the maximum recreational benefits from the completed reservoir and a future development plan should provide for area modifications as the recreation use increases. (See also W74-01058) (Knapp-USGS)
W74-01060

FLOOD STUDIES,
Bureau of Reclamation, Denver, Colo. Flood Hydrology Section.
D. L. Miller, R. A. Clark, and S. Schamach.
In: Design of Small Dams; A Water Resources Technical Publication, p 37-95, 1973 (second edition). 22 fig, 7 tab, 68 ref.

Descriptors: *Design flood, *Reservoir design, *Dam design, Hydrograph analysis, Design storm, Streamflow forecasting, Rainfall-runoff relationships, Probable maximum precipitation, Maximum probable flood.
Identifiers: Small dams.

Methods are given for determining the floodflows to be expected from the drainage area tributary to the reservoir site, for which provision must be made in the design of a dam. In most instances, particularly for structures impounding considerable storage, the inflow design flood is the maximum probable food, which is defined as the largest flood that can reasonably be expected to occur on a given stream at a selected point. Determination of tble flood is based on rational consideration of the chances of simultaneous occurrence of the maximum of the several elements or conditions which contribute to the flood. A major consideration is the determination of the runoff that would result from an occurrence of a probable maximum storm based on meterological factors. This hydrometeorological approach is necessary because streamflow records are of such relatively short duration in the United States that statistical analyses thereof do not provide reliable bases for estimates of maximum probable floodflows.

Methods of determining the magnitude and frequency of floods as indicated by statistical analyses of streamflow records are primarily for use in connection with estimating diversion requirements during construction, establishing frequency of use of emergency spillways used in conjunction with outlets or small spillways, determining peak discharge estimates for diversion dams, or providing other information useful to the designers. (See also W74-01058) (Knapp-USGS)
W74-01061

SELECTION OF TYPE OF DAM,
Dureau of Reclamation, Denver, Colo. Div. of Design and Construction.
H. G. Arthur.
In: Design of Small Dams; A Water Resource Technical Publication, p 97-105, 1973 (second edition). 4 fig.

Descriptors: *Dams, *Reservoir design, *Dam design, Legal aspects, Economics, Cost-benefit analysis, Dam construction, Planning.
Identifiers: Small dams.

Dams may be classified into a number of different categories, depending upon the purpose of the classification. For the purposes of choosing which to use, it is convenient to consider three broad classifications according to use, hydraulic design, or materials of the structure. It is only in exceptional circumstances that an experienced designer can say that only one type of dam is suitable or most economical for a given damsite. Except in cases where the selection of type is obvious, preliminary designs and estquired for several types of dams before one can be shown to be most economical. The selection of the best type of dam for a particular site calls for thorough consideration of the characteristics of each type, as related to the physical features of the site and the adaptation to the purposes the dam is supposed to serve, as well as economy, safety, legal and esthetic limitations. Usually, the greatest single factor determining the final choice of type of dam will be the cost of construction. (See also W74-01058) (Knapp-USGS)
W74-01062

FOUNDATIONS AND CONSTRUCTION MATERIALS,
Bureau of Reclamation, Denver, Colo. Div. of Design and Construction.
J. W. Hilf.
In: Design of Small Dams; A Water Resources Technical Publication, p 107-204, 1973 (second edition). 68 fig, 6 tab, 18 ref.

Descriptors: *Dams, *Dam design, *Construction materials, *Foundation investigations, Dam foundations, Foundation rocks, Soil investigation, Earth materials.

Information relating to foundation conditions and to the natural materials available for construction is essential for the design of small dams. For efficiency, the search for data must be properly planned. Subsurface explorations should not be started until all available geological and soils data have been evaluated. The investigator should know how to classify soils and rocks and should have an understanding of the geological and engineering characteristics of landforms. This background and a knowledge of the capabilities and limitations of the various methods of subsurface exploration will lead to selection of the most appropriate field methods, thereby avoiding time and effort lost through ineffectual procedures. The investigator should be familiar with logging and sampling methods and with the field and laboratory tests used for small dams. Procedures for investigation of foundations and of the various types of construction materials are given in detail. (See also W74-01058) (Knapp-USGS)
W74-01063

EARTHFILL DAMS,
Bureau of Reclamation, Denver, Colo. Div. of Design and Construction.
H. G. Arthur.
In: Design of Small Dams; A Water Resources Technical Publication, p 205-299, 1973 (second edition). 83 fig, 7 tab, 69 ref.

Descriptors: *Dam design, *Dam construction, *Earth dams, Earth materials, Soil mechanics, Dam foundations, Construction materials.

Design procedures are given for small earthfill dams which are of the rolled-fill type of construction is now being used almost entirely for the construction of small dams, to the exclusion of semihydraulic and hydraulic fills. Procedures for the design of earthfill dams include (1) thorough preconstruction investigations of foundation conditions and materials of construction; (2) application of engineering skill and technique to design; and (3) carefully planned and controlled method of construction. Proper construction methods include adequate foundation preparation and the placement of materials in the dam embankment with the necessary degree of compaction under an established procedure of testing and control. (See also W74-01058) (Knapp-USGS)
W74-01064

ROCKFILL DAMS,
Bureau of Reclamation, Denver, Colo. Earth Dams Section.
R. W. Bock, and L. W. Davidson.
In: Design of Small Dams; A Water Resources Technical Publication, p 301-328, 1973 (second edition). 23 fig, 44 ref.

Descriptors: *Rockfill dams, *Dam design, Dam construction, Dam foundations, Construction materials, Rockfill, Earth materials.

Rockfill dams can prove economical when any of the following conditions exist: (1) large quantities of rock are readily available or will be excavated in connection with the project such as from a spillway or tunnel; (2) earthfill materials are difficult to obtain or require extensive processing to be used; (3 seasons prevail; (4) excessively wet climatic conditions limit the placement of large quantities of earthfill material; or (5) the dam is to be raised at a later date. In addition, uplift pressures and erosion due to seepage through the rockfill material do not generally constitute significant design problems. An impervious membrane is used as the water barrier and can be placed either within the embankment or on the upstream slope. Rockfill dams may be classified into three groups, depending on the location of the membrane, as follows: (1) central core, (2) sloping core, and (3) upstream membrane. (See also W74-01058) (Knapp-USGS)
W74-01065

CONCRETE GRAVITY DAMS,
Bureau of Reclamation, Denver, Colo. Hydraulic Structures Branch.
A. T. Lewis, J. S. Conrad, L. M. Christiansen, and E. L. Watson.
In: Design of Small Dams; A Water Resources Technical Publication, p 329-344, 1973 (second edition). 11 fig, 9 ref.

Descriptors: *Gravity dams, *Concrete dams, *Dam design, Dam design, Dam construction, Stress, Reservoir design.

A concrete gravity dam is a structure proportioned so that its own weight provides the major resistance to the forces exerted upon it. The forces which act on concrete gravity dams and the requirements for stability are discussed. Additional considerations in connection with concrete structures on pervious (soil) foundations are presented and current practices regarding miscellaneous details of design are briefly described. (See also W74-01058) (Knapp-USGS)
W74-01066

SPILLWAYS,
Bureau of Reclamation, Denver, Colo. Spillways and Outlet Works Section.
C. J. Hoffman.
In: Design of Small Dams; A Water Resources Technical Publication, p 345-447, 1973 (second edition). 73 fig, 12 tab, 25 ref.

Descriptors: *Dam design, *Spillways, *Design flow, Hydraulics, Dam construction, Overflow, Flood forecasting, Streamflow forecasting, Spillway crests, Drops (Structures).

Spillways are provided for storage and detention dams to release surplus or floodwater which cannot be contained in the allotted storage space, and at diversion dams to bypass flows exceeding those which are turned into the diversion system. Ordinarily, the excess is drawn from the top of the pool created by the dam and conveyed through an artificial waterway back to the river or to some natural drainage channel. Ample capacity is of paramount importance for earthfill and rockfill dams, which are likely to be destroyed if overtopped, whereas concrete dams may be able to withstand moderate overtopping. In addition to providing sufficient capacity, the spillway must be hydraulically and structurally adequate and must be located so that spillway discharges will not erode or undermine the downstream toe of the dam. The spillway's bounding surfaces must be erosion resistant to withstand the high scouring velocities created by the drop from the reservoir surface to tailwater, and usually some device will be required for dissipation of energy at the bottom of the drop. The frequency of spillway use will be determined by the runoff characteristics of the drainage area and by the nature of the development. (See also W74-01058) (Knapp-USGS)
W74-01067

OUTLET WORKS,
Bureau of Reclamation, Denver, Colo. Spillways and Outlet Works Section.
C. J. Hoffman.
In: Design of Small Dams; A Water Resources Technical Publication, p 449-505, 1973 (second edition). 69 fig, 5 tab, 12 ref.

Descriptors: *Dam design, *Outlet works, Hydraulics, Dam construction, Outlets, Spillways.

An outlet works serves to regulate or release water impounded by a dam. It may release incoming flows at a retarded rate, as in the case of a detention dam; divert incoming flows into canals or pipelines, as in the case of a diversion dam; or release stored waters at such rates as may be dictated by downstream needs, evacuation considerations, or a combination of multiple-purpose requirements. The hydraulics of outlet works usually involve either one or both of two conditions of flow--open channel (or free) flow and full conduit (or pressure) flow. Analysis of open channel flow in outlet works, either in an open waterway or in a part full conduit, is based on the principle of steady nonuniform flow conforming to the law of conservation of energy. Full pipe flow in closed conduits is based on pressure flow, which involves a study of hydraulic losses to determine the total heads needed to produce the required discharges. Hydraulic jump basins, baffle or impact block dissipators, or other stilling devices normally are employed to dissipate the energy of flow at the downstream end of the outlet works. (See also W74-01058) (Knapp-USGS)
W74-01068

DIVERSION DURING CONSTRUCTION,
Bureau of Reclamation, Denver, Colo. Earth Dams Section.
E. R. Lewandowski.
In: Design of Small Dams; A Water Resources Technical Publication, p 507-519, 1973 (second edition). 11 fig, 2 ref.

Descriptors: *Dam construction, *Diversion structures, Dam design, Chutes, Diversion tunnels, Dams, Hydraulic structures, Streamflow forecasting, Design flood.

The design for a dam which is to be constructed across a stream channel must consider diversion of the streamflow around or through the damsite during the construction period. The extent of the diversion problems will vary with the size and flood potential of the stream; at some damsites diversion may be costly and time consuming and may affect the scheduling of construction activities, while at other sites it may not offer any great difficulties. The scheme selected ordinarily will represent a compromise between the cost of the diversion facilities and the amount of risk involved. The proper diversion plan will minimize serious potential flood damage to the work in progress at a minimum of expense. The following factors should be considered in a study to determine the best diversion scheme: characteristics of streamflow; size and frequency of diversion flood; methods of diversion; and specifications requirements. (See also W74-01058) (Knapp-USGS)
W74-01069

MAINTENANCE AND OPERATION,
Bureau of Reclamation, Denver, Colo. Div. of Design and Construction.
H. G. Arthur.
In: Design of Small Dams; A Water Resources Technical Publication, p 521-525, 1973 (second edition).

Descriptors: *Reservoir operation, *Maintenance, *Operation and maintenance, Dams, Dam construction.
Identifiers: Dam maintenance.

Arrangements should be made, immediately following the completion of a dam, for periodic inspection of the structure and all of the operating equipment. Written instructions for maintenance and operation of the structures and equipment should be prepared as part of the design function and furnished to the owner or operating agency. These instructions should establish the frequency of and describe the extent and nature of inspections. The instructions should also provide for the routine servicing of mechanical equipment where gates and valves are provided, and should include such instructions furnished by the manufacturer. The instructions should also include detailed discussions of the proper operation of gates and valves from both mechanical and functional viewpoints. If a spillway is controlled by manually operated gates, specific instructions should be given regarding the operation of the gates during flood inflows into the reservoir. (See also W74-01058) (Knapp-USGS)
W74-01070

RIPRAP SLOPE PROTECTION FOR EARTH DAMS: A REVIEW OF PRACTICES AND PROCEDURES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 08D.
W74-01093

8B. Hydraulics

NUMERICAL SIMULATION OF UNSTEADY FLOWS IN RIVERS AND RESERVOIRS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
M. Amein.
Available from NTIS, Springfield, Va. 22151 as COM-73-10674 Price $3.00 printed copy; $1.45 microfiche. Contract Report to National Weather Service, December 31, 1972. 73 p, 26 fig, 10 tab, 19 ref. NOAA-NWS Contract 0-3528.

Descriptors: *Open channel flow, *Unsteady flow, *Fluid mechanics, Rivers, Reservoirs, Channel flow, Numerical analysis, Analytical techniques, Equations, Model studies, Flood flow, Low flow, Channel morphology, Streamflow forecasting.

Unsteady flow in rivers and reservoirs is computed by numerical simulation of the equations of unsteady flow in open channels consisting of the equations for the conservation of mass and momentum. The simulation is based on an implicit finite difference representation of the primary partial differential equations using a centered difference scheme for distance and a forward difference scheme in time. The finite difference equations are nonlinear and are solved by Newton interation method. Applications are given to slowly varied and rapidly varied flows in natural channels and reservoirs. The size of the time step was determined by the nature of the problem ranging from 3 minutes for rapidly varied discharge to several hours for floodflows of long duration. There is excellent agreement between observed and computed values. (Woodard-USGS)
W74-00816

ERRORS IN PIEZOMETRIC MEASUREMENT,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 08G.
W74-00931

MODIFIED SOLUTIONS FOR DECREASING DISCHARGE WELLS,
California Univ., Davis. Dept. of Irrigation.
M. A. Abu-Zied, V. H. Scorr, and G. Aron.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 90, No. HY6, p 145-160, November, 1964. 8 fig, 5 tab, 1 append.

Descriptors: *Wells, Groundwater, Aquifer characteristics, Transmissivity, Drawdown, Water yield, Water storage.
Identifiers: *Nonsteady flow conditions, Steady flow condition, Theis method, Jacob method, *Artesian aquifer.

Several modified solutions are proposed for the problem of nonsteady flow to a well of decreasing discharge which completely penetrates an extensive artesian aquifer. The solutions reduce the computations required in using a general solution. A particular modified solution depends on the magnitude of the discharge and aquifer characteristics. Field data, obtained from an experimental well operating at decreasing discharge, were used to test the validity of the general and modified solutions for the aquifer characteristics. For comparison, Theis' and Jacob's methods for steady flow conditions were applied to the same well test data, and data from a controlled steady flow test in the same well were analyzed. Advantages and limitations of the steady and nonsteady flow methods are considered. (Campbell-NWWA)
W74-00932

MECHANISM OF FLOW AND CONTROLLED DISSOLUTION OF SALT IN SOLUTION MINING,
Texas Univ., Austin.
H. Kazemi, and F. W. Jessen.
Society of Petroleum Engineers Journal, Vol. 4, No 4, p 317-328, December, 1964. 19 fig, 8 ref.

Descriptors: *Underground storage, *Leaching, *Mining, *Sodium chloride, Solvent extraction, Aqueous solutions, Storage, Salts, Pumping, Diffusion, Convection.
Identifiers: *Storage cavity, Solution-control blanket, Dissolution process, Spherical cavity.

A controlled washing technique was developed to form a spherical cavity in salt (such as might be used for LPG storage). A study was made of the flow patterns and the concentration distribution of brine during the dissolution of the salt. The general process of forming a spherical cavity involves control of the fluid motion in the cavity, the concentration distribution of brine, the rate of dissolution at the walls of the cavity, and the setting of the inlet and outlet pipes. An inert fluid (lighter than water) such as an oil, gas or air is injected through the annular space between the original hole and the casing. Fresh water is introduced through the innermost pipe (tubing) and brine returns through the casing in the direct circulation scheme. In the reverse-circulation method, the fresh water enters through the casing-tubing annulus and the brine returns through the tubing. Solution of salt is greatest at the point of entry of the fresh water. Reverse circulation is used to ensure divergence of the cavity in the uppermost portion when dissolving a spherical cavity. The controlled downward movement of the inert blanket maintains the upper edge of the expanding cavity exactly on the surface of the projected sphere. An empirical equation expressing the functional relationship between rate of flow in the model and that of the prototype is offered. (Gray-NWWA)
W74-00934

A SONIC METHOD FOR ANALYZING THE QUALITY OF CEMENTATION OF BOREHOLE CASINGS,
Schlumberger Surenco S.A., Caracas (Venezuela).
For primary bibliographic entry see Field 08F.
W74-00936

CORROSION CONTROL IN LARGE VOLUME PUMPING BRINE WELLS,
Oilwell Research, Inc., Long Beach, Calif.
For primary bibliographic entry see Field 08G.
W74-00937

PULSE TESTING: A NEW METHOD FOR DESCRIBING RESERVOIR FLOW PROPERTIES BETWEEN WELLS,
Esso Production Research Co., Houston, Tex.
For primary bibliographic entry see Field 08G.
W74-00939

HOW TO FIND ABANDONED OIL AND GAS WELLS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 08G.
W74-00941

MAXIMIZING WATER YIELD THROUGH WELL DEVELOPMENT--TECHNICAL MEMO NO. 2,
J. F. Howard, and W. R. Holtzhauser.
Water Well Journal, Vol 27, No 4, p 51-53, April, 1973.

Descriptors: Wells, Water wells, *Aquifers, *Drilling equipment, Well screens, *Water yield.
Identifiers: *Water well construction, Water well development, Underreaming, *Acid treatment, Water producing horizons, Double-inflatable packer.

High yield industrial well projects attempt to produce maximum reliable water supplies from a given property through an extensive well development program. Down-hole well development procedures are discussed primarily. Development procedures are divided into two operations, preliminary development and post drilling development, both of which are discussed. Equipment required for development and special procedures for peculiar situations such as the penetration of multiple aquifers are presented. (Smith-NWWA)
W74-00943

WELL EFFICIENCY AND SKIN EFFECT,
Maryland Univ., College Park.
For primary bibliographic entry see Field 08G.
W74-00945

THE RANGE OF VALIDITY OF THE LINEAR POLARIZATION METHOD FOR MEASUREMENT OF CORROSION RATES,
Noranda Research Centre, Pointe Claire (Quebec).
For primary bibliographic entry see Field 08G.
W74-00947

CORROSION AND INCRUSTATION - GUIDELINES FOR WATER WELLS,
Universal Oil Products. St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 08G.
W74-00948

WHAT'S NEW IN DOWNHOLE OPERATING TECHNOLOGY,
Institut Francais du Petrole, des Carburants et Lubrifiants, Rueil-Malmaison (France).
For primary bibliographic entry see Field 08G.
W74-00950

DEAD END PORE VOLUME AND DISPERSION IN POROUS MEDIA,
Jersey Production Research Co., Tulsa, Okla.
K. H. Coats, and B. D. Smith.
Society of Petroleum Engineers Journal, Vol 4, No 1, p 73-84, March, 1964. 7 fig, 6 tab, 23 ref.

Descriptors: *Porous media, *Diffusion, Flow, *Dispersion, Mathematical models, Cores, Sandstones, Sands, Laboratory tests, Absorption, Heterogeneity, Laplaces equation, Reynolds number.
Identifiers: *Dead-end pores, *Capacitance model, Concentration profile, Formation resistivity factor.

Axial dispersion -- the mixing accompanying the flow of miscible fluids through porous media -- has been considered on the basis of the diffusion model in spite of the deviations between the observed asymmetrical effluent concentration profiles and the predicted symmetrical ones. A laboratory study was made of the displacement of sodium chloride solution by calcium chloride solution from Wassau sand, Ottawa sand, Torpedo sandstone and Alundum. The effluent concentration profile from the two consolidated cores showed considerable asymmetry, while the two unconsolidated cores yielded nearly symmetrical profiles. Breakthrough of the 50% concentration occurred in all tests significantly before one pore volume was injected. The effluent concentration data were compared with the standard diffusion model, a differential form of Dean's finite-stage capacitance model, and a differential capacitance model developed by the authors. The differential capacitance model matched the data significantly better than the diffusion model. The capacitance model allowed the determination of the amount of dead-end pore space in a porous matrix (10% in the Torpedo sandstone) and an estimation of the effect of velocity on the rate of diffusion into this space. (Gray-NWWA)
W74-00951

THE EFFECT OF RESTRICTED FLUID ENTRY ON WELL PRODUCTIVITY,
Shell Oil Co., Los Angeles, Calif.
F. Brons, and V. E. Marting.
Journal of Petroleum Technology, Vol 13, No 2, p 172-174, February, 1961. 4 fig, 2 tab, 6 ref.

Descriptors: *Productivity, *Inflow, *Flow rates, Flow, Hydraulics, Orifices, Flow resistance, Casings, *Wells.
Identifiers: Skin effect, *Perforated casing, Muskats' equations, Pseudo skin factor.

Productivity impairment that results when part of the productive formation is blocked off completely is considered mathematically in terms of 'pseudo skin factors.' The conditions of incomplete penetration of the productive formation and exclusion of parts of the productive zone by blank casing are treated in terms of two parameters. Calculations showed that better productivity is obtained from an interval open in the middle of a productive zone than from the same open interval located at either the top or bottom of the zone. The larger the number of intervals for a given total-penetration ratio, the higher the productivity. Applying the theory qualitatively to a well producing through perforations, the conclusion was that above a certain perforation density the productivity is almost unimpaired and that increasing the number of perforations above this density will add little to the productivity. (Gray-NWWA)
W74-00953

WELL CONSTRUCTION HELPS DETERMINE WATER QUALITY,
Agricultural Research Service, Beltsville, Md. Farmstead Water Systems Research.
For primary bibliographic entry see Field 05B.
W74-00954

DESIGN OF SMALL DAMS.
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 08A.
W74-01058

SPILLWAYS,
Bureau of Reclamation, Denver, Colo. Spillways and Outlet Works Section.
For primary bibliographic entry see Field 08A.
W74-01067

OUTLET WORKS,
Bureau of Reclamation, Denver, Colo. Spillways and Outlet Works Section.
For primary bibliographic entry see Field 08A.
W74-01068

DIVERSION DURING CONSTRUCTION,
Bureau of Reclamation, Denver, Colo. Earth Dams Section.
For primary bibliographic entry see Field 08A.
W74-01069

MAINTENANCE AND OPERATION,
Bureau of Reclamation, Denver, Colo. Div. of Design and Construction.
For primary bibliographic entry see Field 08A.
W74-01070

8C. Hydraulic Machinery

THE TIDAL POWER POTENTIAL OF UNGAVA BAY AND ITS POSSIBLE EXPLOITATION IN CONJUNCTION WITH THE LOCAL HYDROELECTRIC RESOURCES,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 04A.
W74-00838

8D. Soil Mechanics

LEVEE UNIT NO. L-246, MISSOURI RIVER LEVEE SYSTEM (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 04A.
W74-00879

FOUNDATIONS AND CONSTRUCTION MATERIALS,
Bureau of Reclamation, Denver, Colo. Div. of Design and Construction.
For primary bibliographic entry see Field 08A.
W74-01063

EARTHFILL DAMS,
Bureau of Reclamation, Denver, Colo. Div. of Design and Construction.
For primary bibliographic entry see Field 08A.
W74-01064

ROCKFILL DAMS,
Bureau of Reclamation, Denver, Colo. Earth Dams Section.
For primary bibliographic entry see Field 08A.
W74-01065

RIPRAP SLOPE PROTECTION FOR EARTH DAMS: A REVIEW OF PRACTICES AND PROCEDURES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
F. J. Davis, L. R. Burton, A. B. Crosby, L. D. Klein, and E. R. Lewandowski.
Available from NTIS, Springfield, Va. 22151 as PB-219 834; Price $3.00 printed copy; $1.45 microfiche. Report REC-ERC-73-4, March 1973. 23 p, 17 tab, append.

Descriptors: *Earth dams, *Riprap, *Slope protection, Reviews, Methodology, Design criteria, Engineering structures, Rocks, Slope stability, Quarries, Gradation, Maintenance costs, Economics, Dam construction, Hydraulic structures, Materials.

Bureau of Reclamation practices and procedures for investigation, sampling, testing, and field control of riprap slope protection for earth dams are reviewed. Approximately 50 case histories of riprap slope protection were studied. Economics of providing upstream slope protection, including original and lifetime maintenance costs, is the predominant factor in selecting, designing, and constructing the upstream slope protection. Although experience indicates that rock fragments larger than 1 cu yd would be required on many Bureau earth/dam structures to protect slopes against occasional severe storms, few rock sources can provide fragments of that size. Hence, a 36-inch blanket of riprap graded up to 1 cu yd is considered the maximum protection that can be reasonably obtained. Specifications should be revised to include: (1) a gradation that contains more of the larger sizes, (2) stricter placing requirements to obtain/a denser riprap blanket, (3) greater selectivity of quarry material, and (4) closer control of quarry blasting techniques. Detailed instructions to investigators of riprap sources are included. (Woodard-USGS)
W74-01093

8E. Rock Mechanics and Geology

PERMEABILITY RESTORATION IN UNDERGROUND DISPOSAL RESERVOIRS,
Alabama Univ., University. Natural Resources Center.
For primary bibliographic entry see Field 05E.
W74-00554

NEW MUDS DESIGNED TO IMPROVE DRILLING RATE, HOLE STABILITY,
For primary bibliographic entry see Field 08G.
W74-00946

A STOCHASTIC MODEL FOR PREDICTING VARIATIONS IN RESERVOIR ROCK PROPERTIES,
Alberta Univ., Calgary.
D. W. Bennion, and J. C. Griffiths.
Society of Petroleum Engineers Journal, Vol 6, No 1, p 9-16, March, 1966. 14 fig, 2 tab, 22 ref.

Descriptors: *Porosity, *Permeability, *Mathematical models, *Stochastic processes, *Rock properties, Deposition (Sediments), Fourier series, Cores, Frequency analysis, Mathematics, Computer.
Identifiers: *Orthogonal polynomials, Frequency distribution, Bartlett's test.

A mathematical model was developed that predicts both lateral and vertical variations of reservoir rock properties. The model segmented the reservoir horizontally into areas of common variance; then divided it vertically into strata (if strata were present). Next, trend surface techniques were used to determine the lateral extent and variation of each stratum. The model was tested on two reservoirs. The sandstone reservoir consisted of a sand section and a conglomerate section, although the latter was so sporadic that it was not included in the test. A total of 60,000 samples had been taken from 2000 cored wells. The limestone reservoir consisted of a 'marly' and a 'vuggy' section, with 24,000 samples taken from 430 cored wells. Frequency distributions for porosity were approximately normal but those for log-permeability were generally skewed to the right and leptokurtic. Within the areas of common variance tested, the model was able to distinguish four separate lithological units in the sandstone reservoir; four in the marly section and seven in the vuggy section of the limestone reservoir. The model was able to determine a system of equations for predicting the lateral extent, thickness and mean porosity for each zone. (Gray-NWWA)
W74-00955

FOUNDATIONS AND CONSTRUCTION MATERIALS,
Bureau of Reclamation, Denver, Colo. Div. of Design and Construction.
For primary bibliographic entry see Field 08A.
W74-01063

8F. Concrete

A SONIC METHOD FOR ANALYZING THE QUALITY OF CEMENTATION OF BOREHOLE CASINGS,
Schlumberger Surenco S.A., Caracas (Venezuela).
M. Grosmangin, F. P. Kokesh, and P. Majani.
Journal of Petroleum Technology, Vol 13, No 2, p 165-171, February, 1961. 17 fig, 1 ref.

Descriptors: *Cement grouting, *Logging (Recording), *Sound waves, *Well casings, Pipes, Acoustics, Attenuation, Bonding, Boreholes.
Identifiers: *Cement Bond log, *Sonic pulse, Squeeze cementing, Amplitude, Water shut-off.

Bonding of cement to the casing is an important factor in satisfactory well completion. The Cement Bond log operates on the principle that the attenuation of a sonic pulse transmitted by a casing is greatly increased when that casing is bonded to an outer annulus of hard material (such as set cement) which has an appreciably smaller sonic wave velocity than that of the casing. The downhole tool contains a source of recurrent sound pulses which are detected by a receiver spaced a few feet from the source. The amplitude of the detected casing-borne pulse is measured, and the resulting signal is transmitted to the surface where it is recorded for corresponding depths. Because amplitude is a function of attenuation, the log is readily interpreted. Laboratory studies showed that cement that had not set or was not bonded to the casing had little attenuating effect. Field examples show that the log shows not only the top of the cement but also variations in cementation quality. Increase in bonding with time and after squeeze cementing are shown by logs. (Gray-NWWA)
W74-00936

CONCRETE GRAVITY DAMS,
Bureau of Reclamation, Denver, Colo. Hydraulic Structures Branch.
For primary bibliographic entry see Field 08A.
W74-01066

8G. Materials

GENERALIZATION OF HAEFELI'S CREEP-ANGLE ANALYSIS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02C.
W74-00687

ERRORS IN PIEZOMETRIC MEASUREMENT,
Geological Survey, Washington, D.C. Water Resources Div.
W. W. Emmett, and J. R. Wallace.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 90, No. HY6, p 45-61, November, 1964. 11 fig, 1 tab, 11 ref, 2 append.

Descriptors: *Piezometry, Wells, Groundwater, Aquifer characteristics, *Open channel flow.
Identifiers: *Piezometric measurement, Rough channel tests, Smooth channel tests.

Engineering investigations of fluid flow in open channels usually require the measurement of piezometric head. Often the measurement is made by recording the pressure at a piezometer opening on the wall or floor of the channel. An accurate interpretation of the measurement depends on a knowledge of the performance of the piezometer and of the characteristics of the flow being measured. A laboratory investigation was conducted to study the accuracy of piezometric depth measurements in open channels. Influences of boundary geometry and flow characteristics on the piezometric measurements were evaluated. The results of over 3,000 observations indicate that errors in piezometric measurement of depth in smooth, open channels are a function of mean velocity and piezometer hole diameter. For a given piezometer size, the error is expressed as a constant percentage of the mean velocity head. Roughness added to the test channel tended to reduce the magnitude of the error, while mechanically generated surface waves did not influence the piezometric measurement. (Smith-NWWA)
W74-00931

WHAT YOU SHOULD KNOW ABOUT PUMPING TESTS. TECHNICAL MEMO NO. 1,
Illinois State Water Survey, Urbana.
W. H. Walker.
Water Well Journal, Vol. 27, No. 2, p 26-27, March, 1973. 2 fig.

Descriptors: Aquifer characteristics, Hydraulics, Wells, *Water wells, Ground water, *Data collections, *Testing procedures, Analytical techniques, Recharge.
Identifiers: Cone of depression, Barrier boundaries, *Well efficiency.

Much has been written about the analysis of pumping data, without explaining the why and how of the test or the data needed for analysis. The how and why become apparent when a few basic principles of ground water hydrology and the definition of key terms such as: cone of depression; recharge and barrier boundaries; well efficiency and 'hydraulic characteristic' are understood. Basic principles and definitions are explained. The Illinois State Water Survey's procedure for data acquisition for their three-part analysis, constant rate test, recovery test and step test is presented. (Campbell-NWWA)
W74-00933

CORROSION CONTROL IN LARGE VOLUME PUMPING BRINE WELLS,
Oilwell Research, Inc., Long Beach, Calif.
C. C. Wright.
Materials Protection and Performance, Vol 11, No 1, p 23-26, January, 1972. 1 tab, 7 ref.

Descriptors: *Corrosion, Pitting, *Electrolysis, Scaling, Water chemistry, Bacteria, Materials, Bactericides, Analytical techniques, Wells, *Water wells, Dissolved oxygen.
Identifiers: *Incrustation, Oxygen scavangers, *Corrosion inhibitors, Acid treatments, Monitoring programs.

Large volume salt water wells are being increasingly used for cooling waters, water for secondary recovery of oil, and the extraction of minerals. Production of large volumes of brines from pumping wells poses corrosion problems which are either absent or minimized in fresh water wells and in low volume brine wells. Recognition of the differences i.e. large casings, high water velocities, high dissolved gas content; the causes of corrosion, i.e., highly corrosive natural waters, D.O. from cascading water, electrolytic cell formation, bacteria; and preventative measures, i.e., proper material selection, use of oxygen scavangers, corrosion inhibitors, and bactericidal treatments can save sizeable sums of money. Customary control procedures, recommended facility modifications and a continuing monitoring program are described. (Hunt-NWWA)
W74-00937

PULSE TESTING: A NEW METHOD FOR DESCRIBING RESERVOIR FLOW PROPERTIES BETWEEN WELLS,
Esso Production Research Co., Houston, Tex.
C. R. Johnson, R. A. Greenkorn, and E. G. Woods.
Journal of Petroleum Technology, Vol 18, No 12, p 1599-1604, December, 1966. 8 fig, 1 tab, 8 ref.

Descriptors: Flow, *Unsteady flow, *Transmissibility, Storage, *Pressure measuring instruments, Pressure, Oil reservoirs, Heterogeneity, Fractures (Geologic).
Identifiers: *Pulse testing, *Well pair, Differential pressure gauge, Interference tests, Response amplitude, Pulse interval.

The basic element in pulse-testing is the well pair. At the pulsing well a series of flow disturbances is generated by alternate intervals of flow and shutin. A corresponding series of pressure transients propagates through the reservoir and arrives at an adjacent responding well. If the responding well has some wellhead pressure, the slight pressure changes are detected by a sensitive differential-pressure gauge (sensitivity about 0.001 psi). Pulses of a few hours in duration will generate a measurable response in most reservoirs. Consequently, many well pairs can be tested in a short period of time with little disturbance of field operations. Comparison of pulse-test results to conventional testing methods showed that the pulses obeyed unsteady-state, compressible-flow theory and thus gave a measure of both transmissibility and storage. In addition, the method was used qualitatively to describe communication across faults and between zones, and the direction and magnitude of fracture trends. (Gray-NWWA)
W74-00939

HOW TO FIND ABANDONED OIL AND GAS WELLS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
K. H. Johnston, H. B. Carroll, R. J. Heemstra, and F. E. Armstrong.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price $0.75. Information Circular No 8578, 1973. 46 p, 25 fig, 3 tab, 4 append.

Descriptors: *Wells, Oil wells, Technology, *Well regulations, *Methodology.
Identifiers: Electronic metal detectors, Methane detectors, *Abandoned wells, *Search techniques, Coal deposits, Gas wells, Law enforcement.

This guide was written to furnish the coal industry with a description of techniques, instruments, and clues on how to find abandoned oil and gas wells that have penetrated coal seams. Specific information is included on searching techniques currently in use by several coal mining companies, gas-transmission companies, and waterflood operators, as well as information on State agencies responsible for the enforcement of laws and the preservation and distribution of data pertaining to the drilling, development, and abandonment of oil and gas wells. Comparative tests were performed with several commercial electronic metal detectors to determine the feasibility of using them to aid in the search for abandoned wells and to determine the instrument most suited for the particular use. The role of methane detectors to locate abandoned wells is described, including a case history. Tests were made to develop an efficient procedure to follow in systematically searching an area for metallic clues or hydrocarbon evidence to abandoned wells. The guide describes, in detail, a search sequence, including the collection of basic data, preparation of the selected area, and the physical search. Methods are given for evaluating the results. (Hunt-NWWA)
W74-00941

DETECTION AND ESTIMATION OF DEAD-END PORE VOLUME IN RESERVOIR ROCK BY CONVENTIONAL LABORATORY TESTS,
California Univ., Berkley.
I. Fatt, M. Maleki, and R. N. Upadhyay.
Society of Petroleum Engineers Journal, Vol 6, No 3, p 206-212, September, 1966. 12 fig, 1 tab, 14 ref.

Descriptors: *Permeability, *Porosity, *Laboratory tests, Cores, Limestones, Porous media, Rock properties, Capillary action, Flow.
Identifiers: *Formation factor, Dead-end pores, *Oomolidic limestone, Mercury injection, Miscible displacement, Pressure transients.

Equations conventionally used to describe reservoir flow behavior contain the implicit assumption that all connected pore spaces contributed to both porosity and permeability. Laboratory studies were made on two limestones suspected of having dead-end pore spaces, and on a sandstone believed to have little or no dead-end pore spaces. Using 3/4-inch diameter core plugs, measurements were made of the electric logging formation factor, mercury injection capillary pressure, miscible displacement, and pressure transient behavior. Methods are described and results are shown graphically. These tests indicated that about 20% of the measured pore volume in the two limestones was not taking part in fluid flow. The size of the neck connecting dead-end pores to the main flow channels was estimated from the pressure transient tests. The formation factor and mercury injection tests can be made at relatively low cost on reservoir rock samples. From results of these tests, samples suspected of having dead-end pore space can be selected for the more diagnostic miscible displacement and pressure transient tests. (Gray-NWWA)
W74-00944

WELL EFFICIENCY AND SKIN EFFECT,
Maryland Univ., College Park.
Y. M. Sternberg.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 99, No IR2, p 203-206, June, 1973. 2 append, 8 ref.

Descriptors: *Wells, Water wells, *Aquifer characteristics, Permeability, Hydraulics, Mathematical studies, Equations.
Identifiers: Radius of influence, Laminar flow, *Hydraulic conductivity, Head loss, *Well efficiency.

A technique is presented for determining the skin effect using previously derived flow equations. This technique is applicable only to wells affected by losses due to laminar flow (both the normal losses and those in the damaged zone) and does not account for turbulent losses that may be present in large capacity wells. Drawdown data taken at an observation well and at the pumped well, operating at constant discharge, are required in this method. The condition of a well can be determined by comparing actual drawdown at the pumped well to the calculated values using the aquifer characteristics determined from an observation well. (Hunt-NWWA)
W74-00945

NEW MUDS DESIGNED TO IMPROVE DRILLING RATE, HOLE STABILITY,
G. R. Gray.
World Oil, Vol 176, No 6, p 84-86, May, 1973. 1 fig, 36 ref.

Descriptors: Wells, *Well drilling, *Drilling fluids, Mud, *Rock mechanics, Hydraulics, Chemical reactions, Polymers.
Identifiers: *Low solids, Drilling fluids, Balanced pressure drilling, *Borehole stability, *Organic polymers, Shale hydration.

Maximum drilling rate with good hole conditions is being sought by intensive studies of factors affecting penetration rate and hole stability. Balanced pressure drilling, minimum solids, drilling fluids, and control of shale hydration have practical applications as part of a minimum cost drilling program. Currently the emphasis is on the use of minimum solids muds for maximum penetration rate, coupled with organic polymers for hole stability. Advantages of balanced pressure drilling have been amply documented. The types and uses of low solids drilling fluids to achieve maximum penetration, prevent shale hydration and improve hole stability are presented. (Campbell-NWWA)
W74-00946

THE RANGE OF VALIDITY OF THE LINEAR POLARIZATION METHOD FOR MEASUREMENT OF CORROSION RATES,
Noranda Research Centre, Pointe Claire (Quebec).
R. L. Leroy.
Corrosion, Vol 29, No 7, p 272-275, July, 1973. 6 fig, 11 ref.

Descriptors: *Corrosion, Mathematical studies, *Graphical methods, *Analytical techniques.
Identifiers: *Linear polarization, Corrosion potential, *Tafel slopes.

The validity of the linear polarization method for determining corrosion rates is critically examined. It is shown that curvature of polarization curves at the corrosion potential does not negate the value of this technique. Diagrams are presented which show the matrix of anodic and cathodic Tafel slopes for which the linear polarization method can be used to derive the corrosion current, within a stated error limit. Several examples demonstrate the utility of these diagrams for both anodic and cathodic linear polarization measurements. (Smith-NWWA)
W74-00947

CORROSION AND INCRUSTATION - GUIDELINES FOR WATER WELLS,
Universal Oil Products. St. Paul, Minn. Johnson Div.
J. L. Mogg.
Water Well Journal, Vol 27, No 2, p 30-33, 35-36, March, 1973. 1 fig, 6 tab, 4 ref.

Descriptors: Corrosion, Scaling, Well screens, Materials, *Corrosion control, *Iron bacteria, *Bactericides, Water quality, Chemicals, *Water wells, Sulfur bacteria.
Identifiers: *Incrustation, *Sulfate-reducing bacteria, Ryznar Stability Index, Chemical corrosion, Electrochemical corrosion, Electromotive series, Acid treatments.

Corrosion, incrustation and bacterial plugging are defined and discussed with respect to their causal effects on water well failure. The two processes of corrosion, chemical and electrochemical, and the relationship of water chemistry and the electromotive series to metals as the cause of corrosion is presented. Guidelines for selecting the most corrosion resistant metal by use of the Ryznar Stability Index for Material are presented. The parameters for probable occurrence of iron and sulfate-reducing bacteria and methods for reducing or eliminating the effects of incrustation and bacterial plugging are presented. (Hunt-NWWA)
W74-00948

WHAT'S NEW IN DOWNHOLE OPERATING TECHNOLOGY,
Institut Francais du Petrole, des Carburants et Lubrifiants, Rueil-Malmaison (France).
R. Desbrandes.
World Oil, Vol 176, No 7, p 74-75, 78, June, 1973. 3 fig, 22 ref.

Descriptors: *Geophysics, *Borehole geophysics, *Logging, Resistivity, Gravity studies, Technology.
Identifiers: Nuclear magnetism log, Unbound case fluids, Spherically focused log, Sheer wave velocities.

Important advances in tools for analyzing well potential and performance have been made since last year's comprehensive review, World Oil, April, 1972. Downhole logging techniques for determining formation properties in drilling wells and new completions, and improvements in geophysical surveying are emphasized. Information on several drilling and production aids, such as a downhole 'listening' device to detect sand production and a unique electronic method for continuously measuring amount of drill pipe in the hole are presented. Logging while drilling, open hole logging, cased hole logging, logging for geophysics and transmitting and handling log data are discussed. (Smith-NWWA)
W74-00950

CORROSION CONTROL IN WATER WELLS,
Black, Crow and Eidsness, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 05F.
W74-00952

BOREHOLE LOGGING INVESTIGATIONS IN THE CHALK OF THE LAMBOURN AND WINTERBOURNE VALLEYS OF BERKSHIRE,
Institute of Geological Sciences, London (England).
T. K. Tate, A. S. Robertson, and D. A. Gray.
Research Rept No. 5, 1971. 23 p, 13 fig, 3 tab, 7 ref, 2 append.

Descriptors: *Geophysics, *Electrical well logging, Borehole cameras, Boreholes, *Geothermal studies, *Resistivity, Subsurface investigations, Subsurface waters, Wells, *Groundwater movement.
Identifiers: Great Britain, Regional groundwater flow.

The results of borehole investigations made in nine production and ten observation boreholes sunk in the Chalk of the Lambourn and Winterbourne Valleys, Berkshire, Great Britain, are described. Electrical resistivity, temperature, electrical conductivity, and borehole fluid velocity are examined. Evidence suggests that the level at which pump suction is placed influences the yield drawn from different contributory levels, even though the total amount of water withdrawn may be the same. It is concluded that the principal inflows of groundwater to the boreholes occur at or near the bottom of the casing, with relatively small contributions from fractures at depth. Inflows take place at such restricted levels that generalized assumptions concerning the thickness of the aquifer may be unwarranted. The significance of these observations in terms of regional ground water flow is briefly discussed. (Hunt-NWWA)
W74-00956

8I. Fisheries Engineering

SALTWATER POND RESEARCH,
Texas Parks and Wildlife Dept., Austin.
L. L. Elam.
Available from NTIS, Springfield, Va., 22151 as COM-72-11292 Price $3.00 printed copy; $1.45 microfiche. Completion report for NOAA, National Marine Fisheries Service, May 1972. 62 p, 28 tab, 7 ref. 2-78-R.

Descriptors: *Marine fish, *Ponds, *Saline water, *Fisheries, *Fish management, Investigations, Testing procedures, Growth rates, *Texas, Marking techniques, Trout, Oysters, Shrimp, Spawning, Fish diseases, Mortality, Ecology, Biology.
Identifiers: *Saltwater ponds, Red drum, Spotted seatrout, Southern flounder, Black drum, Sheepshead.

Pond culture experiments were initiated in Texas at the Marine Research Station in the fall of 1969. Postlarval brown and pink, and juvenile brown, pink and white shrimp were stocked at various rates, different durations of study periods, different feeding levels, and various salinity ranges. Research on marine fishes included: studies to evaluate selected fish tagging methods, studies to determine mortality rates of fish released after capture with commercial fishing gear, studies concerning the propagation of selected fishes, and pond studies on marine fishes adaptable to pond culture. Species studies included red drum, spotted seatrout, southern flounder, black drum, and sheepshead. Research concerning oyster growth, survival, adaptability to pond environment, and disease resistant capabilities were conducted. Replicate studies were conducted in a clay and an asphalt bottom pond to determine the suitability of weathered asphalt as a bottom substrate for oyster culture operation. Oyster mortalities in the asphalt bottom pond were similar to those which occurred in the clay bottom ponds but growth in the clay bottom ponds was better. Moderate Labyrinthomixa sp. infections were recorded in all pond-held oysters sampled. Light infection intensities were recorded from oysters held in the bay. (Woodard-USGS)
W74-00815

HISTORY OF IMPORTING RAINBOW TROUT, PARASALMO GAIRDNERII (RICHARDSON, 1836) INTO BOHEMIAN COUNTRIES, (IN CZECH),
Ceskoslovenska Akademie Ved, Praque.
L. Kalal.
Identifiers: History, Parasalmo-Gairdnerii, *Rainbow trout, *Trout rearing, *Czecoslovakia.

The rainbow trout P. gairdnerii has been reared in Bohemian Countirs since the year 1888. The end of World War II (army transfers) dealt a heavy blow to the rearing of this fish. New generative material was reared from fish eggs and yearlings imported from Denmark from 1946-1949. Trout rearing of the State Pisciculture and in most cases also of the Anglers' Association have therefore a uniform material in general, which proved well. New imports did not take place until the middle sixties. One import was realized from the USA, 3 imports from Denmark, one from Poland. The origin of fish imported from the USA has been impossible to find, from Denmark, according to information of the importers the form 'kamloops' was obtained, the fish from Poland originate from fish eggs imported from the station of the Seattle University, Washington (USA). Fish from new imports are being observed and until their rearing qualities are determined, their spreading is not recommended. For rearing and especially breeding reasons it is necessary to keep an exact account of them and of future imports.--Copyright 1973, Biological Abstracts, Inc.
W74-01019

EXPERIMENTAL STUDIES OF POLYCULTURE IN 1971,
Fish Culutre Research Station, Dor (Israel).
A. Yashouv, and A. Halevy.
Bamidgeh. Vol 24, No 2, p: 31-39. 1972.
Identifiers: *Carp, Cultures, Polyculture, *Silver carp, *Tilapia-Aurea, *Tilapia-Vulcani.

Experiments were carried out on polyculture of carp, silver carp and tilapias under fertilization and with and without supplementary feedings. Yields obtained in 187 days' growth without supplementary feeding reached 2350 kg/ha with biweekly fertilization and 1980 kg/ha with weekly fertilization. Experiments with weekly fertilization and supplementary feeding gave the following results in 223 days of growth: 9140-10, 620 kg/ha in ponds with Tilapia vulcani and 8570-9450 kg/ha in ponds with T. aurea. Weekly fertilization without supplementary feeding gave increased carp and silver carp yields, but not Tilapia yields. Supplementary feeding (pellets) increased carp yields 4-fold, and the Tilapia yield 7-fold. The silver carp were hardly influenced by the pellets. The coefficient of exploitation of supplementary feed (pellets) was 1.25 in ponds with Tilapia vulcani and 1.39 with T. aurea.--Copyright 1973, Biological Abstracts, Inc.
W74-01021

EFFICIENCY OF MULLET GROWTH IN FISHPONDS,
Fish Culture Research Station, Dor (Israel).
A. Yashouv.
Bamidgeh. Vol 24, No 1, p: 12-25. 1972.
Identifiers: Cyprinus-Carpio, *Fish growth, Mugil-Capito, Mugil-Cephalus, Ponds, *Mullet growth, Tilapi Aurea.

Gray mullet (Mugil cephalus) was grown in monoculture in ponds, and also in polyculture with Mugil capito, Tilapia aurea and Cyprinus carpio. The ponds were fertilized with superphosphate and ammonium sulfate and with chicken manure. There was no clear effect of crowding on the growth of gray mullet in monoculture, but this species showed enhanced growth when grown in polyculture with the other species. The other species, however were somewhat stunted on their growth in the presence of gray mullet.--Copyright 1973, Biological Abstracts, Inc.
W74-01022

REMARKS ON THE STOCKING OF THE DAM RESERVOIR AT PRZECZYCE WITH LAKE TROUT SALMO TRUTTA M LACUSTRIS L,
Polish Academy of Sciences, Krakow. Zakland Biologii Wod.
Z. Wajdowicz.
Acta Hydrobiol. Vol 14, No 2, p 205-212. 1972. Illus.
Identifiers: Dams, Lakes, *Poland (Przeczyce), Reservoirs, Salmo-Trutta-M-Lacustris, Spawning, *Stocking, *Trout.

As the result of stocking the dam reservoir at Przeczyce (Poland) numerous young lake trout were found in the river above the dam and individual adult specimens were found in the reservoir. During autumn a few spawning migrations of mature lake trout from the reservoir to the river were observed. Individual spawned females were found, but no spawning traps. Smolts of lake trout were bred from artificially inseminated spawn. The emptying of the reservoir interrupted the process of acclimatization. Some factors impeding full acclimatization, which is determined by natural spawning, are described.--Copyright 1973, Biological Abstracts, Inc.
W74-01072

AQUATIC VEGETATION OF FISHPONDS OF THE WESTERN REGIONS OF THE UKRAINE, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
For primary bibliographic entry see Field 04A.
W74-01075

WEIGHT-LENGTH RELATIONSHIP AND GROWTH OF CHANOS CHANOS (FERSSKAL) GROWN IN FRESHWATER PONDS,
Institute of Fisheries Development and Research, Diliman, Quezon City (Philippines).
R. O. Juliano, A. U. Baes, R. F. Ventura, and A. O. Isidro.
Nat Appl Sci Bull. Vol 22, No 3/4, p 113-131, 1970. Illus.
Identifiers: Carp, *Chanos-chanos, Freshwater ponds, Growth, Length, Ponds, *Red carps, Weight, *Milkfish.

Based on data regularly sampled on a monthly basis in 4 freshwater ponds, the weight-length relationship equations of milkfish covering a size range from 80 mm to 200 mm are as follows: Log W ± 5.73591 + 3.31866 log L for Pond 4, log W ± -5.17666 + 3.5995 log L for Pond 6 (1968), log W ± -5.01705 + 2.96479 log L for Pond 5, and log W ± -5.07492 + 3.00273 log L for Pond 6 (1969). The culture period ranged from 2-5 mo. Analysis of the variance of condition factor (K) of the fish at different lengths and in different ponds showed no significant difference. Isometric growth is apparently exhibited by the milkfish within the size range in the experiment. Growth increments in length and in weight are as follows: 91.8 mm and 7.6 grams (5 mo. rearing) in Pond 4, 98.2 mm and 52.8 grams (4 mo. rearing) in Pond 5,90.1 mm and 43.4 g (2 mo. rearing) in Pond 6 (1968), and 101.6 mm and 55.2 g (4 mo. rearing) in Pond 6 (1969). The use of the Walford growth transformation curve to predict the L seems not practical on monthly sampled data. Mixing of red carps with milkfish in one of the ponds did not inhibit the rate of growth of milkfish.--Copyright 1973, Biological Abstracts, Inc.
W74-01080

OBSERVATIONS ON THE DEVELOPMENT OF COREGONUS PELED (GMEL.) FRY IN PONDS,
Panstwowy Instytut Hydrologiczno-Meteorologiczny, Mikolajki (Poland).
S. Bernatowicz.
Acta Hydrobiol. Vol 14, No 2, p 165-172, 1972.
Identifiers: *Coregonus-Peled, *Fry, Ponds, *Stocking, Growth rates, Fish parasites.

The main difficulty encountered in the production of stocking material of C. peled in ponds are high losses in the first year of age. Observations were made on the growth of C. peled fry in the period from spring to autumn. Growth rate, condition, survival and parasites were also considered.--Copyright 1973, Biological Abstracts, Inc.
W74-01081

ALGAE FEEDING OF YOUNG OF CERTAIN FISH SPECIES OF THE KAIRAK-KUMSKII RESERVOIR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
S. A. Andrievskaya.
Izv Akad Nauk Tadzh Ssr Otd Biol Nauk. 1, p 49-53, 1972.
Identifiers: *Algae, Bacillariophyta, Chlorophyta, Cyanophyta, Euglenophyta, Fish foods, Plankton, Reservoirs, Species, USSR (Kairak-Kumskii reservoir), Zooplankton.

Contents of 195 intestines of 11 spp. of fish young were studied in order to evaluate consumption of algae by larvae, fry and current brood (1963-1964). Composition of food lumps was analyzed visually in terms of percentage of total food. Research showed that during the summer fish young eat benthos, zooplankton, and plant organisms. Species of algae found were enumerated, including 7 spp. of Cyanophyta, 34 of Bacillariophyta, 2 of Euglenophyta, and 19 of Chlorophyta. Plant detritus and slime were observed in intestines of all species to different degrees. It is concluded that during the summer, some species feed primarily on crustaceans and midge larvae; other species feed primarily on algae, plant residue, slime stritus.--Copyright 1973, Biological Abstracts, Inc.
W74-01082

WHITE AMUR IN THE ILI RIVER BASIN, (IN RUSSIAN),
G. M. Dukravets.
Izv Akad Nauk Kaz Ssr Ser Biol. 1, p 52-57, 1972.
Identifiers: Ctenopharyngodon-idella, Phytocenosis, Rivers, *USSR (Ili River basin), *White amur.

The white amur-Ctenopharyngodon idella (Val.) was first brought into Balkhash--Ili basin USSR, in 1958. This species is now established up to the source of the river and throughout the area, and plays an important role in ichthyocenoses and influences phytocenosis formation. Morphological characteristics and growth indices are tabulated.--Copyright 1973, Biological Abstracts, Inc.
W74-01083

COMPARATIVE EFFICIENCY OF THE AREA UNIT USED FOR FISH BREEDING AND OTHER AGRICULTURAL PURPOSES, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
G. I. Shpet.
Gidrobiol Zh. Vol 8, No 3, p 62-68, 1972. (English summary).
Identifiers: Breeding, *Carp breeding, Comparative efficiencies, Fish breeding.

The productivity of the area unit used for fish breeding is compared with that for other agricultural purposes. On the basis of the author's original data and those from references, it is concluded that carp breeding is the most productive fishery.--Copyright 1973, Biological Abstracts, Inc.
W74-01084

EXPERIMENTAL STUDIES ON FEEDING THE COMMON CARP CYPRINUS CARPIO L. IN EGYPT,
Cairo Univ., Giza (Egypt). Faculty of Science.
H. M. Bishai, W. D. Labib, and M. M. Ishak.
Bull Instoceanogr Fish. 2: p 275-295. 1972. Illus.
Identifiers: Bran, *Carp, Cottonseed, Cyprinus-Carpio, *Egypt, *Fish foods.

Feeding tests for the common carp C. carpio fingerlings of about 3 mo. old were carried out for a period of 8 mo., from Oct.-June. The test feeds were rice bran, cotton seed-cake and 4 diet-mixtures of different proportions of rice bran and cotton seed-cake. During the experimental period, the monthly water temperature ranged between 14.7 and 31.4C. Cotton seed-cake gave a better growth for the fish than rice bran feed. However, cotton seed-cake is not recommended as the sole diet for carp due to the relatively high cost of production and due to changes in the flavor of the fish flesh. For both feeds, increasing the level of feeding from 10-20% daily of the fish weight did not significantly increase the growth rate of the fish. The addition of cotton seed-cake to rice bran improved the efficiency of rice bran as a diet for carp. The diet mixture composed of 75% rice bran and 25% cotton seed-cake gave the highest gain in weight at a relatively low cost, comparable to cotton seed-cake. In spite of the abundant supplementary food given to the fish, they did not show appreciable gain in weight during the winter months of Dec.-Feb. The natural diet alone present in the cement experimental ponds failed to satisfy the requirements of maintenance and growth for the experimental fish.--Copyright 1973, Biological Abstracts, Inc.
W74-01100

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

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Michigan Dept. of Natural Resources, Lansing. Water Resources Commission.
For primary bibliographic entry see Field 05G.
W74-00701

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Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-01092

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Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 05C.
W74-00704

THE EFFECTS OF STRIP MINING UPON NAVIGABLE WATERS AND THEIR TRIBUTARIES: DISCUSSION AND SELECTED BIBLIOGRAPHY.
Pittsburgh Univ., Pa. Graduate Center for Public Works Administration.
For primary bibliographic entry see Field 05C.
W74-00725

FACTORS OF CHEMICAL FERTILIZATION IN SALINE WATER IRRIGATION: A REVIEW,
Negev Inst. for Arid Zone Research, Beersheba (Israel). Dept. of Plant Introduction and Ecology.
For primary bibliographic entry see Field 03C.
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OXYGEN-CONSUMING ORGANIC MATTER (BOD) IN EFFLUENTS ORIGINATING IN DIFFERENT PULPING PROCESSES OF THE WOODWORKING INDUSTRY: REVIEW OF LITERATURE DURING THE YEARS 1960-1970,
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For primary bibliographic entry see Field 05B.
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BIBLIOGRAPHY OF REPORTS ON THE WATER RESOURCES OF INDIANA PREPARED BY THE U.S. GEOLOGICAL SURVEY, 1886--1972,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 02E.
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

- 1 NATURE OF WATER
- 2 WATER CYCLE
- 3 WATER SUPPLY AUGMENTATION AND CONSERVATION
- 4 WATER QUANTITY MANAGEMENT AND CONTROL
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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 3
FEBRUARY 1, 1974

W74-01101 – W74-01650

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 3
FEBRUARY 1, 1974

W74-01101 -- W74-01650

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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1B. Aqueous Solutions and Suspensions

THERMODYNAMICS OF ACID-BASE EQUILIBRIA. II. IONIZATION OF M- AND P--HYDROXYBENZOTRIFLUORIDE AND THE CONCEPT OF FLUORINE DOUBLE BOND-NO BOND RESONANCE,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01226

02. WATER CYCLE

2A. General

A DETERMINISTIC PARAMETRIC WATER--BALANCE MODEL,
Norwegian Water Resources and Electricity Board, Oslo.
H. Grip.
Nordic Hydrology, Vol 4, No 3, p 191-205, 1973. 10 fig, 3 tab, 7 ref.

Descriptors: *Water balance, Mathematical models, Recession curves, Rainfall-runoff relationships, Hydrograph analysis, Water storage, Soil moisture, Hydrologic cycle.

A simple deterministic model, that needs little input-data is based on an analysis of the recession curve. Input data consist of time-series of precipitation, initial values of storage in upper and lower soil storages and in interception storage, and initial runoff. Output data are time series of evapotranspiration, interception, upper and lower soil storages and runoff, all given as 2-hour mean values. (Knapp-USGS)
W74-01126

NUMERICAL SIMULATION OF THE RAINFALL-RUNOFF PROCESS ON A DAILY BASIS,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
S. A. Nielsen, and E. Hansen.
Nordic Hydrology, Vol 4, No 3, p 171-190, 1973. 9 fig, 3 tab, 8 ref.

Descriptors: *Simulation analysis, *Rainfall-runoff relationships, Streamflow forecasting, Water storage, Soil moisture, Snowmelt, Overland flow, Base flow, Subsurface runoff, Numerical analysis, Hydrographs.

A digital model was developed for the simulation of the rainfall-runoff process of rural watersheds. Input data are daily values of precipitation and temperature together with mean monthly potential evapotranspiration. The model produces daily values of streamflow as well as information on the time variation of the soil moisture content. The model operates by accounting continuously for the moisture content in four different and mutually interrelated storages representing physical elements in the watershed. Simulations demonstrate that the main shortcoming of the model are due to the lack of a procedure accounting for frozen ground during extended periods of frost. (Knapp-USGS)
W74-01127

DEVELOPMENT OF A CONCEPTUAL DETERMINISTIC RAINFALL-RUNOFF MODEL,
Swedish Meteorological and Hydrological Inst., Stockholm.
S. Bergstrom, and A. Forsman.
Nordic Hydrology, Vol 4, No 3, p 147-170, 1973. 19 fig, 3 tab, 5 ref.

Descriptors: *Rainfall-runoff relationships, Mathematical models, Infiltration, Percolation, Runoff forecasting, Streamflow forecasting, Hydrographs.

A simple conceptual rainfall-runoff model was developed at the Swedish Meteorological and Hydrological Institute. The HBV-2 Model is based on lumped-parameter approximations to the physical laws governing infiltration, percolation and runoff formation. The time interval is one day. The model structure includes soil moisture storage, upper zone storage, and lower zone storage. A procedure for evaluating the parameter values is given. Examples of applications to several test catchments in various hydrologic settings are included. (Knapp-USGS)
W74-01128

RESERVOIR MECHANISM IN AN AQUIFER OF ARBITRARY BOUNDARY SHAPE,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
For primary bibliographic entry see Field 02F.
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INTERNATIONAL SCIENTIFIC AND TECHNICAL COOPERATION IN THE FIELD OF WATER PROBLEMS (MEZHDUNARODNOYE NAUCHNO-TEKHNICHESKOYE SOTRUDNICHESTVO V OBLASTI VODNYKH PROBLEM),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 06E.
W74-01138

DIVISION OF THE UNITED STATES INTO REGIONS ACCORDING TO COPHASAL FLUCTUATIONS OF ANNUAL RUNOFF (RAYONIROVANIYE TERRITORII SSHA PO SINFAZNOSTI KOLEBANIY GODOVOGO STOKA REK),
For primary bibliographic entry see Field 02E.
W74-01140

CHEMICAL RELATIONSHIPS BETWEEN SURFACE WATER AND THE GROUND IN SOUTH FLORIDA,
Miami Univ., Coral Gables, Fla.
For primary bibliographic entry see Field 02K.
W74-01153

UTILIZATION OF REMOTE SENSING IN RIVER BASIN STUDIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05A.
W74-01154

OBJECTIVE REGIONALIZATION OF PEAK FLOW RATES,
Agricultural Research Service, Chickasha Okla. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 04D.
W74-01174

HYDRODYNAMIC MODELING OF TWO--DIMENSIONAL WATERSHED FLOW,
Illinois Univ., Urbana. Dept. of Civil Engineering.
V. T. Chow, and A. Ben-Zvi.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10172, p 2023-2040, November 1973. 4 fig, 1 tab, 28 ref, append. NSF Grants GK-1155 and GK-11292.

Descriptors: *Mathematical models, *Simulation analysis, *Rainfall-runoff relationships, Floods, Runoff, Water yield, Finite element analysis.

Unsteady surface flow over watersheds was modeled hydrodynamically by a system of quasilinear partial differential equations for two velocity components and a flow depth at any point on the watershed. Computer solution is possible by a difference scheme based on the combination of the Lax-Wendroff scheme with Burstein-Lapidus modifications. A numerical example is given for the solution of watershed flow resulting from a uniform rainfall intensity and finite duration. Preliminary results indicate that the model is suitable for the study of watershed flow. (Knapp-USGS)
W74-01278

PROCESSING AND STORAGE OF HYDROMETEOROLOGICAL DATA IN THE ATMOSPHERIC ENVIRONMENT SERVICE,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 07C.
W74-01290

COMPUTER UTILIZATION OF HYDROLOGICAL DATA FOR NORTH NASHWAAKSIS REPRESENTATIVE BASIN,
New Brunswick Univ., Fredericton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 07C.
W74-01294

DATA ACQUISITION AND STORAGE FOR RESEARCH WATERSHEDS,
Guelph Univ. (Ontario). School of Engineering.
For primary bibliographic entry see Field 07C.
W74-01295

THE MASS BALANCE OF THE SEA ICE OF THE ARCTIC OCEAN,
Department of Energy, Mines and Resources, Ottawa (Ontario). Polar Continental Shelf Project.
For primary bibliographic entry see Field 02C.
W74-01374

SHORT-TERM SNOW MELT AND ABLATION DERIVED FROM HEAT- AND MASS-BALANCE MEASUREMENTS,
Department of the Environment, Ottawa (Ontario). Waters Branch.
For primary bibliographic entry see Field 02C.
W74-01380

SIMULATING THE BEHAVIOR OF A MULTI--UNIT, MULTI-PURPOSE WATER-RESOURCE SYSTEM,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 06A.
W74-01468

PHYSICAL SYSTEM MODELLING AS A TOOL IN WATER RESOURCE PLANNING,
Department of the Environment, Ottawa (Ontario).
H. M. Hill, and J. Bergsima.
Engineering Journal, Vol 56, No 9, p 26-30, September 1973. 1 fig, 6 ref.

Descriptors: Water resources, *Comprehensive planning, *Watersheds (Basins), *Institutional constraints, *Multiple-purpose projects, *Systems analysis, Hydrology, Water quality, Physical properties, Optimum development plans, Social aspects, Economics, Benefits, Mathematical models, Water supply, Waste treatment.
Identifiers: *Canada (Grand River watershed), *Environmental quality, Planning agencies.

The effectiveness of a water resources comprehensive plan is determined by to what extent all

relevant variables are considered, and to what extent institutional characteristics are understood so that the programs of all agencies concerned are directed towards fulfillment of the one, intrarelated, comprehensive plan. Such planning is multi-objective, multi-jurisdictional, and multi-discipline, and involves multiple agencies, water uses, and programs. The planning function is characterized by economic development, environmental quality, and social well-being. Comprehensive planning and modelling of water resources in Canada are discussed. Institutional constraints on planning are analyzed, and a generalized operational framework of a typical Canadian watershed, the Grand River watershed in Ontario, is used to reflect the multiple-purpose nature of water resources planning. Included are water quality, water supply, and waste treatment operations. The major function of planning boards in Ontario is discussed, and hydrologic and water quality modeling are discussed to examine how the natural system analysis, and thus the direction of the planning function, is influenced by the institutional characteristics. It is concluded that no one agency can undertake water resources modeling to optimize a total hydrologic system. (Bell-Cornell)
W74-01487

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME 2. HYDROLOGIC DATA MANAGEMENT,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
For primary bibliographic entry see Field 02E.
W74-01642

2B. Precipitation

PRECIPITATION VARIABILITY OVER NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
W. J. Saucier, A. H. Weber, and C. K. Bayne.
Available from the National Technical Information Service as PB-225 123/9, $5.25 in paper copy, $1.45 in microfiche. Water Resources Research Inst., University of North Carolina. Report No. 84, August 1973. 185 p, 22 fig, 14 tab, 55 ref, 12 append. OWRR A-061-NC (3).

Descriptors: *Rainfall, Precipitation intensity, Droughts, *North Carolina, *Weather patterns.
Identifiers: *Precipitation variability, *Rainfall distribution patterns.

Variability of precipitation is analyzed in detail for records of 40 to 50 years or more. The probability of occurrence of wet or dry days is calculated for various thresholds of rainfall. Using the Freyerherm-Bark model, tables of initial and transitional probabilities and confidence limits are calculated. Tables of sequences of wet and dry days are also calculated. Computer programs and example problems are presented. Monthly total precipitation is calculated by station and tables and maps are given for the monthly means and of variance about the means. Long-term variations in precipitation were found in analyzing 40-year data series. Variations due to tropical storms are also analyzed. Conclusive evidence is presented that long-term variations do occur and affect nearby locations quite differently. (McJunkin-North Carolina)
W74-01111

COASTAL PROCESSES AND BEACH DYNAMICS AT SHEBOYGAN, WISCONSIN, JULY, 1972,
Williams Coll., Williamstown, Mass.
For primary bibliographic entry see Field 02H.
W74-01130

COMPARISON OF GAGE AND RADAR METHODS OF CONVECTIVE PRECIPITATION MEASUREMENT,
National Oceanic and Atmospheric Administration, Coral Gables, Fla. Experimental Meteorology Lab.
A. Herndon, W. L. Woodley, A. H. Miller, A. Samet, and H. Senn.
National Oceanic and Atmospheric Administration Technical Memorandum ERL OD-18, March 1973. 67 p, 20 fig, 11 tab, 30 ref.

Descriptors: *Rainfall intensity, *Rain gages, *Radar, *Florida, Correlation analysis, Data collections, Remote sensing, Evaluation, Convection, Cloud seeding, Heat transfer, Rainfall.

During the summer of 1972 convective rainfall over south Florida was estimated by two collocated, calibrated 10-cm radars (UM/10-cm of the University of Miami and the WSR-57 of the National Hurricane Center) and compared with the rainfall as determined by rain gages in small cluster arrays. These comparisons were variable, but in the mean both radars tended to underestimate the rainfall, particularly the heavier showers. On a daily basis, the mean absolute percentage differences for the periods of radar operation ranged between 35% and 40%. The radars were within a factor of two of the cluster standard nearly 70% of the time. Comparison of this finding with that in the gaging section suggests that the radars approximated a gage network of 20-30 sq mi/gage. The performances of the radars were very similar. The correlations between gage and radar rainfalls were 0.87 and 0.84 for the UM/10-cm and WSR-57 radars, respectively. The correlation between radar rainfalls for 46 common showers was 0.94. In the context of Experimental Meteorology Laboratory's cloud seeding experiments, neither gage nor radar methods of convective precipitation evaluation is entirely adequate by itself unless the effect of seeding on precipitation is unexpectedly large (greater than a factor of two). (Woodard-USGS)
W74-01149

THE SOVIET DARMS PROGRAM--TWENTY YEARS OF DEVELOPMENT, DEPLOYMENT, AND DATA,
National Science Foundation, Washington, D.C. Office of Polar Programs.
For primary bibliographic entry see Field 07C.
W74-01157

BAROMETRIC PRESSURE MEASUREMENTS FROM BUOYS DURING AIDJEX 1972,
Washington Univ., Seattle.
For primary bibliographic entry see Field 07B.
W74-01159

A RESONANT CAPSULE PRESSURE TRANSDUCER FOR DATA BUOYS,
Kollsman Instrument Corp., Syosset, N.Y.
For primary bibliographic entry see Field 07B.
W74-01160

THE UNION OF THE COLUMBIA RIVER AND THE PACIFIC OCEAN -- GENERAL FEATURES,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W74-01183

PROCESSING AND STORAGE OF HYDROMETEOROLOGICAL DATA IN THE ATMOSPHERIC ENVIRONMENT SERVICE,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 07C.
W74-01290

CLIMATOLOGICAL STATIONS IN CALIFORNIA, 1971,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 07C.
W74-01383

SIMULATION MODELS FOR WATER--RESOURCE SYSTEMS: THEIR UTILITY IN MEASURING PHYSICAL AND ECONOMIC EFFECTS OF WEATHER FORECASTING AND WEATHER MODIFICATION: SUMMARY REPORT,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 03B.
W74-01463

SOIL AND WATER CONSERVATION ON ARABLE LANDS,
Soils Inst., Tehran (Iran). Soil and Water Conservation Div.
For primary bibliographic entry see Field 03F.
W74-01633

2C. Snow, Ice, and Frost

PROBLEMS IN HYDROLOGY OF GLACIERS AND GLACIERIZED AREAS (PROBLEMY GIDROLOGII LEDNIKOV I LEDNIKOVYKH RAYONOV),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
G. A. Avsyuk, V. M. Kotlyakov, V. G. Khodakov, and G. N. Golubev.
Vodnyye Resursy, No 2, p 3-20, 1973. 7 fig, 1 tab, 27 ref.

Descriptors: *Glaciohydrology, *Glaciers, Mountains, Ice, Snow, Firn, Melt water, Snowmelt, Melting, Ablation, Regimen, Hydrologic cycle, Water balance, Precipitation (Atmospheric), Runoff, Heat balance, International Hydrological Decade, Maps, Equations.
Identifiers: *USSR, Glacier mass balance, Paleoglaciology.

According to latest estimates, glaciers in the USSR cover 81,900 sq km. The volume of water stored in the glaciers is 13,750 cu km or about three times the annual runoff volume of all USSR rivers. In mountainous regions, glaciers cover about 21,000 sq km. The volume of ice is more than 2,800 cu km, and the water equivalent of this volume is about 2,450 cu km. A glaciological method is presented for calculating average precipitation and average long-term meltwater discharge at the boundary of glacier nourishment, and a map shows these values for the USSR and adjoining lands. An equation is given for the water-ice balance of a glacier basin, and possibilities of measuring and calculating major items in this balance are considered. A scheme is developed for calculating glacier internal nourishment, and results are presented of research on water regimen of glaciers as a whole and of individual ice-formation zones on glaciers. Successes in artificial augmentation of melting by surface dusting of glaciers and in computations and forecasts of floods and other consequences of catastrophic movements of pulsating glaciers are described. Possibilities of applying results of glacier mass balance studies to paleoglaciological research are noted, and basic directions of glacier investigations following the International Hydrological Decade in 1974 are outlined. (Josefson-USGS)
W74-01132

ARCTIC DATA BUOYS AND AIDJEX,
Washington Univ., Seattle.
For primary bibliographic entry see Field 07B.
W74-01156

SINGLE-VELOCITY METHOD IN MEASURING DISCHARGE,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
P. W. Strilaeff, and W. Bilozor.
Technical Bulletin No 75, 1973. 21 p, 5 fig, 6 tab, 13 ref.

Descriptors: *Streamflow, *Flow measurement, *Flow rates, *Canada, *Cold regions, Ice cover, Gaging stations, Hydrologic data, Velocity, Methodology, Mathematical studies, Hydrographs, Discharge measurement.
Identifiers: *Manitoba (Canada), *Northwest Territories (Canada), Single-velocity method.

In 1968 an analysis was made of discharge measurement records for a number of gaging stations located in Manitoba, Canada, and Northwest Territories. The purpose of the analysis was to discover the relationship between discharge measurements made on the basis of single velocity observations in the cross section, and discharge measurements made using traditional techniques. The relationship appeared to be very promising and the results were documented. This summary report is based on a more intensive and exhaustive analysis of the relationship and suggests procedures to be followed when applying the single-velocity method in discharge measurement work. (Woodard-USGS)
W74-01161

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01168

DEVELOPMENT OF A TIME-SPACE PREDICTION TECHNIQUE TO EVALUATE SNOWPACKS IN AND ADJACENT TO FOREST OPENINGS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 03B.
W74-01231

ACQUISITION, STORAGE AND PROCESSING OF GLACIER INVENTORY DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W74-01292

SEASONAL VARIATION OF CHEMICAL PARAMETERS IN ALASKAN TUNDRA LAKES,
Skidmore Coll., Saratoga Springs, N. Y. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-01347

SIMULTANEOUS DETERMINATION OF MANGANESE, COPPER, ARSENIC, CADMIUM, ANTIMONY AND MERCURY IN GLACIAL ICE BY RADIOACTIVATION,
Naval Undersea Center, San Diego, Calif.
For primary bibliographic entry see Field 05A.
W74-01361

THE MASS BALANCE OF THE SEA ICE OF THE ARCTIC OCEAN,
Department of Energy, Mines and Resources, Ottawa (Ontario). Polar Continental Shelf Project.
R. M. Koerner.
Journal of Glaciology, Vol 12, No 65, p 173-185, 1973. 4 fig, 5 tab, 13 ref.

Descriptors: *Water balance, *Sea ice, *Arctic Ocean, Melting, Ablation, Regimen.
Identifiers: Mass balance.

From data taken on the British Trans-Arctic Expedition it was calculated that 9% of the Arctic Ocean surface between the North Pole and Spitsbergen was hummocked or ridged ice, 17% was unridged ice less than a year old, 73% was unridged old ice and 0.6% was ice-free. The mode of 250 thickness measurements taken through level areas of old floes along the entire traverse lies between 2.25 and 2.75 m. The mean end-of-winter thickness of the ice was calculated to be 4.6 m in the Pacific Gyral and 3.9 m in the Trans-Polar Drift Stream. From measurements of the percentage coverage and thickness of the various ice forms, it was calculated that the total annual ice accumulation in the Arctic Ocean is equivalent to a continuous layer of ice 1.1 m thick. 47% of this accumulation occurs in ice-free areas and under ice less than 1 year old; 20% of the total ice production is either directly or indirectly related to ridging or hummocking. An ice-ablation rate of 500 kg per sq m was measured on a level area of a multiyear floe. Greatest melting occurs on new hummocks and least on old smooth hummocks. The annual balance of ice older than 1 year but younger than multiyear ice was calculated from a knowledge of ice-drift patterns and the percentage coverage of first-year ice. The same calculations give a mean-maximum drift period of 5 years for ice in the Trans-Polar Drift Stream and 16 years in the Pacific Gyral. For the period February 1968 to May 1969 the annual ice export was 5,580 cu km. (Knapp-USGS)
W74-01374

ICEBERGS AS A FRESH-WATER SOURCE: AN APPRAISAL,
Cold Regions Research and Engineering Lab., Hanover, N. H.
W. F. Weeks, and W. J. Campbell.
Journal of Glaciology, Vol 12, No 65, p 207-233, 1973. 16 fig, 1 tab, 36 ref.

Descriptors: *Icebergs, *Water sources, Water conveyance, Water costs, Antarctic, Water yield improvement.

A history of the idea of transporting large icebergs to arid regions to provide a fresh-water source is presented. Only in the Antarctic are supplies of large tabular icebergs available. Data on the size distribution of these icebergs are reviewed and it is concluded that icebergs of almost any desired size can readily be located. Steady-state towing velocities of different sized icebergs are calculated based on estimates of the drag of the icebergs and the bollard pull of tugs. Because drag increases with velocity squared, large icebergs can only be towed at very slow velocities (<0.5 m/s). However, tugs that can be built within the capabilities of current technology are capable of towing extremely large icebergs. Although melting losses are significant and may be excessive for small icebergs, when large icebergs are towed, large amounts of ice are left when the iceberg arrives at its destination. Towing trajectories, travel times, and ice delivery rates are calculated for optimum routes between Amery Ice Shelf and Western Australia and the Ross Ice Shelf and the Atacama Desert. Forces included in these calculations are towing, air, water, gradient current and Coriolis. Transit times exceed 107 d and 145 d with over 50% of the initial ice delivered. After total towing charges are paid, it is possible to deliver ice to Western Australia for 1.3 mills/per cu m of water and to the Atacama Desert region for 1.9 mills/per cu m. The water delivered by the operation of one super tug alone would irrigate 16,000 sq km. Problems related to both iceberg transport and processing are reviewed and although substantial problems do exist, they appear to be within the capabilities of current technology. (Knapp-USGS)
W74-01375

ICE CALVING INTO THE PROGLACIAL GENERATOR LAKE, BAFFIN ISLAND, N.W.T., CANADA,
Deptment of the Environment, Ottawa (Ontario). Glaciology Div.
G. Holdsworth.
Journal of Glaciology, Vol 12, No 65, p 235-250, 1973. 10 fig, 14 ref, 3 append.

Descriptors: *Glaciers, *Icebergs, *Lake ice, Ablation, *Canada, Melting, Water balance, Water level fluctuations.
Identifiers: *Calving (Icebergs), Baffin Island.

The morphology of the margin of Barnes Ice Dap, Baffin Island, at the proglacial Generator Lake is described. Types of calving that take place into the lake are discussed, particularly an observed calving in July 1970 when an ice-ramp of about 0.4 million cu m volume broke off due to a rise in lake level. Bending analyses throw some light on the calving mechanism. At Generator Lake, the margin of Barnes Ice Cap has recently retreated about five times further than the retreat of the adjacent land-based margin. The present ice front is characterized by cliffs and ramps in the approximate ratio of 1:1. A cliff is associated with an immediately grounded ice margin and a ramp is defined as a tapered projecting tongue of ice detached from the bottom of the lake but not necessarily floating in equilibrium. Cliffs occur in water shallower than about 30 m, whereas ramps predominate in water deeper than about 30 m. Typically, water depth exceeds 50 m just off the ramps. (Knapp-USGS)
W74-01376

FLOW OF A VALLEY GLACIER WITH A SOLID FRICTION LAW,
Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Glaciologie.
L. Reynaud.
Journal of Glaciology, Vol 12, No 65, p 251-258, 1973. 7 fig, 1 tab, 4 ref.

Descriptors: *Glaciers, *Rheology, *Friction, Melting, Velocity, Glaciology, Flow.
Identifiers: Canada (Athabasca Glacier).

Friction on the bed of a glacier is assumed to obey Coulomb's law of solid friction in the presence of interstitial pressure. According to this, the friction is a maximum at certain places in the bottom of the valley. Assuming Glen's nonlinear creep law, the steady-state flow of ice along a regular cylindrical channel of parabolic section was calculated. The results reproduce to high accuracy the distribution of velocity measured on the Athabasca Glacier. (Knapp-USGS)
W74-01377

SEISMIC EVIDENCE FOR GLACIER MOTION,
Alaska Univ., College. Geophysical Inst.
D. VanWormer, and E. Berg.
Journal of Glaciology, Vol 12, No 65, p 259-265, 1973. 6 fig, 1 tab, 2 ref.

Descriptors: *Glaciers, *Movement, *Seismic studies, *Alaska, Shear, Strain.
Identifiers: *College Fiord (Alas).

Unusual seismic signals with weak P phases and well-developed monochromatic shear-wave trains were recorded and their sources located near College Fiord, Alaska. Epicentral determinations show that they originate on or near glaciers. Some of the events have equivalent earthquake magnitudes of 2.0 to 2.5. These energy sources seem to be compatible with spasmodic glacier movement. Smaller events occur often--as many as 60 per day. (Knapp-USGS)
W74-01378

ON THE FORMATION OF SMALL MARGINAL LAKES ON THE JUNEAU ICEFIELD, SOUTH--EASTERN ALASKA, U.S.A.,
Turku Univ. (Finland). Institutum Geographicum.
M. Seppala.
Journal of Glaciology, Vol 12, No 65, p 267-273, 1973. 7 fig, 9 ref.

Descriptors: *Lakes, *Glaciers, *Wind erosion, *Blowouts, Glaciohydrology, Glaciology, *Alaska.
Identifiers: Proglacial lakes, *Juneau Icefield (Alas).

Small 'moat lakes', sometimes empty, sometimes filled with water, are encountered on the edges of glacial firn areas of the Juneau Icefield in southeastern Alaska. The lake basins are primarily blowouts formed as a result of wind erosion. On the Juneau Icefield strong winds blow from the southern sector, principally from the southeast, and cause drifting. The lake basin develops in such a way that meltwater from the surface of the glacier and the slopes of the nunatak collects in the depression originially made by the wind. (Knapp-USGS)
W74-01379

SHORT-TERM SNOW MELT AND ABLATION DERIVED FROM HEAT- AND MASS-BALANCE MEASUREMENTS,
Department of the Environment, Ottawa (Ontario). Waters Branch.
P. M. B. Fohn.
Journal of Glaciology, Vol 12, No 65, p 275-289, 1973. 6 fig, 3 tab, 20 ref.

Descriptors: *Snowmelt, *Heat balance, *Water balance, *Glaciers, Ablation, Melting, Meteorology, Meteorological data, Heat transfer.

Daily melt rates of glaciers can be determined with a maximum relative error of 20% by evaluating the ice matrix density (in contrast to the total snow density) of the immediate surface and subsurface layers and by evaluating the decrease in volume. Neglecting the ice-density changes in the subsurface layer would, on the average, reduce the daily melt rates by 22%. The heat-balance approach gives satisfactory results on a daily basis and a close agreement for longer periods. The distribution of the total absorbed energy between the different components for the whole period was as follows: all-wave net radiation 44%, sensible heat 48%, and the latent heat (condensation), 8%. This distribution corresponds to a pattern often encountered over snow surfaces at low elevations in midsummer, when the convective heat is equal to or even exceeds the radiative heat, whereas the condensation process is a rather minor heat source. The heat-balance approach represents a useful method for obtaining melt rates for periods of several days. Applying such an approach, the use of a lumped melt index like the degree-day factor can be avoided. (Knapp-USGS)
W74-01380

COMPARISON OF THE SNOW RESISTOGRAPH WITH THE RAM PENETROMETER,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
W. St. Lawrence, and C. C. Bradley.
Journal of Glaciology, Vol 12, No 65, p 315-321, 1973. 4 fig, 5 ref.

Descriptors: *Snowpacks, *Avalanches, *Instrumentation, Data collections, Strength, Snow surveys, Calibrations.
Identifiers: *Snow resistograph, *Snow penetrometer.

Comparative tests of the snow resistograph with the ram penetrometer indicate that there is a high degree of correlation between the two instruments despite fundamental differences in operation. It is probable therefore that the two instruments are measuring essentially the same parameters and may be used interchangeably. The resistograph has a large advantage over the ram penetrometer, in terms of speed and ease of operation, and in its capacity to measure the strength of very weak snow. (Knapp-USGS)
W74-01381

GEOPHYSICAL MEASUREMENTS OF THE THICKNESS OF THE MALYY AZAU GLACIER (GEOFIZICHESKIYE OPREDELENIYA MOSHCHNOSTI LEDNIKA MALYY AZAU),
Moscow State Univ. (USSR). Problemnaya Laboratoriya Kompleksnogo Kartografirovaniya i Atlasov.
L. A. Ushakova, A. V. Bryukhanov, and A. P. Tishchenko.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 99-101, September-October 1971. 1 fig.

Descriptors: *Glaciers, *Measurement, *Gravimetry, *Gravimetric analysis, Gravimeters, Density, Ice, Glacial drift.
Identifiers: *USSR (Malyy Azau Glacier), Glacier tongues.

The gravity method was used to measure the thickness of the Malyy Azau Glacier (area--8.49 sq km; length--7.58 km) on the southern slope of Mount Elbrus in the Caucasus. Average thickness of the glacier tongue, calculated from Bouguer effects, is 80-100 m, and the maximum thickness is 150 m. The gravity method is a promising method for measuring the thickness of mountain glaciers, but, because of errors involved, must be combined with seismic or radar sounding. (Josefson-USGS)
W74-01390

USE OF ISOTOPIC METHODS TO DETERMINE PRESENT RATES OF SNOW ACCUMULATION IN ANTARCTICA (ISPOL'ZOVANIYE IZOTOPNYKH METODOV DLYA OPREDELENIYA SOVREMENNOY SKORSTI NAKOPLENIYA SNEGA V ANTARKTIDE),
Akademiya Nauk SSSR, Moscow. Institut Geokhimii i Analiticheskoi Khimii.
V. D. Vilenskiy, R. V. Teys, V. V. Yemel'yanov, and S. N. Kochetkova.
Geokhimiya, No 9, p 1071-1082, September 1972. 5 fig, 4 tab, 19 ref.

Descriptors: *Antarctic, *Snow, *Snow cover, *Isotope studies, *Analytical techniques, Stable isotopes, Deuterium, Oxygen isotopes, Lead radioisotopes, Radioactivity, Depth, Seasonal.
Identifiers: *USSR (Antartica).

Determination of present rate of snow accumulation at Molodezhnaya, Mirnyy, and Vostok Antarctic stations by means of isotopic methods is discussed. To determine rate of snow accumulation and to identify annual layers in modern glacial deposits of coastal and central regions of the Antarctic continent, seasonal variations in radioactivity and variations in stable isotope contents must be considered. The accurary of determining mean rate of snow accumulation from variations in Pb-210 concentration with depth (in Pb-210 determinations carried out on snow samples corresponding to an accumulation period of about 10 years) cannot be improved by using thinner cut samples because of large variations in the Pb-210 concentration. To estimate irregularity of present-day snow accumulation at different points in the same region, it is recommended that three zones having different radioactivities be identified in the snow cover deposited since 1955. Simultaneous application of several isotopic methods have made it possible to determine the present snow accumulation rate at Mirnyy to be about 30 g/sq cm/yr, at two points near Molodezhnaya to be about 15 and 22 g/sq cm/yr, and at Vostok to be about 3 g/sq cm/yr. (Josefson-USGS)
W74-01393

SPECTRAL ABSORPTION OF SOLAR RADIATION IN ALPINE SNOWFIELDS,
Oregon State Univ., Corvallis. Dept. of Oceanography.
H. Curl, Jr., J. T. Hardy, and R. Ellermeier.
Ecology. Vol 53, No 6, p 1189-1194. 1972. Illus.
Identifiers: Absorption, Algae, Alpine, Regression, Seasons, *Solar radiation, *Spectral absorption, *Snowfields.

Penetration of solar radiation into snow at various times of the year was measured with a spectral radiometer. Light absorption obeys a $y \pm axn$ law where n varies from 0.71 to 2.10. The absorption coefficient n decreases with increasing snow density. The 1% of surface value of total energy occurs at a snow depth of approximately 18 cm in winter, increasing to a maximum of 110 cm in late summer when snow density is near its maximum. Penetration of 0.1% of the surface radiation is shown to coincide with the approximate date and depth of snow pack for the first spring bloom of snow algae, implying that increasing light penetration may initiate germination of overwintering stages.--Copyright 1973, Biological Abstracts, Inc.
W74-01626

2D. Evaporation and Transpiration

POTENTIAL USEFULNESS OF ANTITRANSPIRANTS FOR SOLUTION OF SOME WATER SUPPLY, PLANT GROWTH, AND ENVIRONMENTAL PROBLEMS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 03B.
W74-01105

SOIL SALINIZATION UNDER IRRIGATED CULTIVATION,
Haryana Agricultural Univ., Hissar (India). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01238

LEAF TEMPERATURES, DIFFUSION RESISTANCES, AND TRANSPIRATION,
Macquarie Univ., North Ryde (Australia). School of Earth Sciences.
E. T. Linacre.
Agric Meteorol. Vol 10, No 4/5, p 365-382. 1972, Illus.
Identifiers: *Diffusion resistance, Grape vine, *Leaf temperature, Resistances, Temperatures, *Transpiration.

A simple model of the energy flows about a leaf yields new expressions for the temperature, external diffusion resistance, internal diffusion resistance and the transpiration rate. The effects are considered of either coating the leaf to make its surface impermeable to water vapor, or wetting the leaf surface, or shading it. Four methods of deriving a leaf's external resistance and 4 for determining the transpiration rate were deduced, and compared using data from field measurements on intact grape vine leaves. The results obtained by the various methods are roughly similar.--Copyright 1973, Biological Abstracts,Inc.
W74-01254

DIURNAL CHANGES IN TRANSPIRATION AND DAILY PHOTOSYNTHETIC RATER OF SEVERAL CROP PLANTS,
Agricultural Research Service, Watkinsville, Ga.
J. E. Pallas, Jr.
Crop Sci. Vol 13, No 1, p 82-84. 1973.
Identifiers: *Crop yield, Daily, *Diurnal changes, Growth, *Photosynthesis, *Transpiration, Measurement, Cotton, Bell pepper, Peanuts, Soybeans, Bermudagrass.

Measurements of photosynthesis and transpiration of soil-grown, growth chamber-cultured cotton (Gossypium hirsutum L. cv. 'Empire'), bell pepper (Capsicum frutescens L. cv. 'California Wonder'), peanut (Arachis hypogaea L. cv. 'Florigiant'), soybean (Gossypium max Merr. cv. 'Lee') and bermudagrass (Cynodon dactylon L.) plants were made during 14-hr photoperiods: irradiance 1.17. (joules)cm2/min, day-night temperature 30 degrees C, and CO2 concentration 310 micro1/1. A diurnal trend in both photosynthesis and transiration was evidenced by the dicots but not the monocot. The sinusoidal nature of the curves suggest endogenous rhythm changes in diffusive resistance and/or biochemical activity. As much as 2-fold changes in cotton and peanut photosynthesis were recorded compared to approximately 30% change in bell pepper and soybean photosynthesis. These findings jeopardize the relevancy of short-time photosynthetic measurements used in some screening techniques.--Copyright 1973, Biological Abstracts, Inc.
W74-01597

STOMATAL-DIFFUSION RESISTANCE AND WATER POTENTIAL OF SOYBEAN AND SORGHUM LEAVES,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
For primary bibliographic entry see Field 03F.
W74-01605

WATER USE BY PERENNIAL EVERGREEN PLANT COMMUNITIES IN AUSTRALIA AND PAPUA NEW GUINEA,
Queensland Univ., Brisbane (Australia). Dept. of Botany.
R. L. Specht.
Australian Journal of Botany, Vol 20, No 3, p 272-299, December 1972. 13 fig, 4 tab, 46 ref, append.

Descriptors: *Water utilization, Water requirements, Ecology, Plant growth, Plant populations, *Drought tolerance, Arid lands, Environment, Climatic data, *Australia, *Water balance, Ecosystems, Model studies, Evapotranspiration.
Identifiers: *Papua New Guinea, *Evergreens (Perennial), Eucalyptus.

Availability of water is the major ecological factor determining the productivity of plant communities in many areas of the world. Comparison of the water use of plant communities growing in different habitats depends on establishing relationships between community evapotranspiration and parameters which express the evaporative power of the atmosphere and the availability of water in the soil to plant roots. The water balance model developed uses empirical relationships between monthly values of precipitation, evapotranspiration, pan evaporation, drainage (infiltration and percolation) and extractable soil water. There is no doubt that this model obscures many finer processes which operate continuously within the ecosystem, However, the purpose is to discuss the water balance of perennial evergreen plant communities (usually natural) in Australia and Papua New Guinea and eventually from this to model the growth of these ecosystems. At present, significant changes in biomass of these ecosystems can only be defined with difficulty. Refined aerodynamic techniques in which carbon dioxide fluxes above a plant community are used may eventually be appliacable to long-term continuous monitoring of deterogeneous, irregularly structured plan communities. (Black-Arizona)
W74-01634

2E. Streamflow and Runoff

A STOCHASTIC MODEL OF STREAMFLOW BASED ON THE THEORY OF FUNCTIONS OF MARKOV PROCESSES,
Arizona Univ., Tucson.
C. C. Kisiel, J. L. Denny, and S. J. Yakowitz.
Available from the National Technical Information Service as PB-225 146/0, $3.00 in paper copy, $1.45 in microfiche. Project Completion Report, August 1971. 8 p, 6 ref. OWRR A-023-ARIZ (1). 14-31-0001-3203.

Descriptors: *Streamflow forecasting, *Statistical models, *Markov processes, *Stochastic processes, Flow measurement, Correlation analysis, Hydrographs, Analytical techniques, Evaluation, *Arizona, Streams.

Two streams (Rilliot and Sabino Creeks) in southern Arizona were studied with particular reference to understanding their random behavior. Analysis gives unexpectedly strong evidence that certain streamflow measurements possess the statistical characteristics of a Markov chain of order no larger than six or seven. This permits statistical estimation and hypothesis testing of the parameters of the stream, leads to a simple but realistic nonlinear model of streamflow, and allows a simple method of predicting future streamflow using past streamflow measurements. In addition, statistical evidence appeared to support the contention that urbanization in the vicinity of the stream forces a trend toward dry readings at the stream's measuring station. (Woodard-USGS)
W74-01123

DIVISION OF THE UNITED STATES INTO REGIONS ACCORDING TO COPHASAL FLUCTUATIONS OF ANNUAL RUNOFF (RAYONIROVANIYE TERRITORII SSHA PO SINFAZNOSTI KOLEBANIY GODOVOGO STOKA REK),
N. V. Lalykin.
Vodnyye Resursy, No 2, p 183-189, 1973. 3 fig, 2 tab, 3 ref.

Descriptors: *United States, *Runoff, *Annual, *Fluctuations, Variability, Correlation analysis, Cycles, Rivers, River basins, Maps.
Identifiers: *USSR.

Data used to divide the United States into 13 regions according to the character of cyclic fluctuations of annual runoff were derived from surface-water records collected by the U.S. Geological Survey between 1900 and 1959 (Water Supply Papers 1301-1318 and 1721-1738). Runoff cycles for each region are described, and a method is proposed for determining size of rivers from patterns of areal variability of the coefficients of correlation between runoff on individual rivers. Relations of coefficients of correlation of annual runoff on small lowland and mountain streams to distance centers of gravity of the basins are graphed, and areas of cophasal fluctuations of annual runoff in the United States are mapped. (Josefson-USGS)
W74-01140

NEAR REAL TIME WATER RESOURCES DATA FOR RIVER BASIN MANAGEMENT,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 04A.
W74-01150

STABILITY AND REACH LENGTH IN WATER SURFACE PROFILE DETERMINATION,
Stanley Consultants, Inc., Muscatine, Iowa. Dept. of Engineering.
G. F. Tavener.
Water Resources Bulletin, Vol 9, No 5, p 950-962, October 1973. 5 fig, 3 tab, 2 ref, 1 append.

Descriptors: *Profiles, *Flow profiles, *Backwater, Flood plains, Floods, Hydraulics.

Basic step methods of backwater computation are extended to reaches of finite length. Accuracies of commonly accepted hydraulic loss equations under particular water surface profile conditions are compared. Simulation of energy lines within a reach by parabolic curves minimizes error provided orientation of the axis of the parabola is selected in accordance with prevailing hydraulic conditions. An index reach length beyond which single-step computation from end to end of the reach must be in error was developed. Reduction of this reach length by suitable factors tailored to hydraulic conditions yields a mathematically defined allowable reach length for backwater computation. When reach length does not exceed this allowable reach length, no significant error may be detected. Automatic insertion of synthetic cross sections interpolated between surveyed cross sections (when these are inadvertently spaced too far apart) enables computation to proceed. This device is error-free for prismatic channels but may introduce error for irregular natural channels. Results may be accepted provided the fall in the original reach does not exceed one to two feet. When this is exceeded, additional cross sections should be surveyed. (Knapp-USGS)
W74-01152

THE SOVIET DARMS PROGRAM--TWENTY YEARS OF DEVELOPMENT, DEPLOYMENT, AND DATA,
National Science Foundation, Washington, D.C. Office of Polar Programs.
For primary bibliographic entry see Field 07C.
W74-01157

THE ARCTIC DATA BUOY, A SYSTEM FOR ENVIRONMENTAL MONITORING IN THE ARCTIC,
Washington Univ., Seattle. Applied Physics Lab.
For primary bibliographic entry see Field 07B.
W74-01158

SINGLE-VELOCITY METHOD IN MEASURING DISCHARGE,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 02C.
W74-01161

MARINE RESOURCES AND OCEAN SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07B.
W74-01169

THE BREAKING OF WAVES ON A SLOPING BEACH,
Rolls-Royce Ltd., Derby (England). Advanced Research Group.
A. Jeffrey.
Zeitschrift fur Angewandte Mathematik und Physik, Vol 15, No 7, p 97-106, March 1964. 5 fig, 9 ref.

Descriptors: *Coasts, *Beaches, *Waves (Water), Equations.
Identifiers: Discontinuity equation.

Calculations were made of the non-linear one-dimensional propagation of a periodic wave train into water which is at rest above a uniformly sloping beach, and the condition for the breaking of the incident wave was determined. The method is also directly applicable to problems in which the beach has a nonuniform slope. The method involves a discussion of the behavior of the Lipschitz continuous solution in the vicinity of the wavefront and does not depend for its success on special properties of the equations involved. Numerical results are presented for a typical problem showing the variation of the critical time and distance as functions of wave amplitude, wave frequency and the slope of the beach. (Sinha-OEIS)
W74-01176

BEACH CHANGES ON THE OUTER BANKS OF NORTH CAROLINA,
Virginia Univ., Charlottesville.
R. Dolan.
Annals of Association of American Geographers, Vol 56, No 4, p 699-711, December 1966. 5 fig, 9 tab, 24 ref. ONR Nonr-1575 (03).

Descriptors: *North Carolina, *Beaches, Surf, *Waves (Water), Sediments, *Topography, Water levels.
Identifiers: *Bodie Island (NC), *Shoaling.

Relationships between surf-zone processes and subaerial beach changes are considered as they occur on Bodie Island, North Carolina. The processes include: wave height, wave period, wave direction, and still-water level. Measurements of beach change include: beach thickness, width, and slope, as well as the size and sorting of the beach-face sediment. Analysis reveals that changes in these beach characteristics are predictable using only two of the process factors considered: wave height and stillwater level. Large waves with high water levels cause rapid reductions in beach thickness, width, and slope. Small waves with low water levels are associated with thicker, wider, and steeper beaches. Sediment size and sorting show little association with the processes of beach configuration. (Sinha-OEIS)
W74-01179

LONGSHORE CURRENT VELOCITY: A REVIEW OF THEORY AND DATA,
Army Coastal Engineering Research Center, Washington, D.C.
C. J. Galvin, Jr.
Reviews of Geophysics, Vol 5, No 3, p 287-304, August 1967. 7 fig, 3 tab, 24 ref.

Descriptors: *Coasts, Momentum equation, *Velocity, *Currents (Water), Energy equation, *Forecasting.
Identifiers: *Longshore currents, *Conservation of mass.

A proven prediction of longshore current velocity is not available, and reliable data on longshore currents are lacking over a significant range of possible flows. Theoretical studies have been based on over-simplified models, and empirical predictions have been hampered by lack of data. The empirically modified, momentum-flux theory now accepted as the best prediction is based on an untenable assumption and supported by inappropriate data. Regardless of their validity, however, all six of the testable equations agree fairly well with at least one of six sets of published data, and two agree with both of the better sets of data. These two equations may be used as empirical guides for velocity prediction in the absence of a proven theory. The best prospect for a generally valid velocity prediction appears to be an empirical correlation based on reliable data. (Sinha-OEIS)
W74-01187

NOTE ON THE EQUATIONS OF LONG WAVES OVER AN UNEVEN BOTTOM,
National Engineering Science Co., Pasadena, Calif.
C. C. Mei, and B. Le Mehaute.
Journal of Geophysical Research, Vol 71, No 2, p 393-400, January 15, 1966. 10 ref. ONR Nonr 4177 (00).

Descriptors: *Shallow water, *Waves (Water), *Coasts, Continental shelf, Equations, *Topography.
Identifiers: *Shoaling, *Long waves.

Equations for long waves in shallow water are derived systematically for an uneven bottom. With the basic assumption that the depth is small in comparison with a horizontal length scale, three regimes of approximation are presented according to the magnitude of the wave amplitude. (a) When the amplitude is of the same order of magnitude as the depth, the Airy equations are rederived as the first approximation. (b) When the amplitude is comparable to the cube of the depth, both lengths being nondimensionalized with respect to a common horizontal scale, two high-order nonlinear equations are obtained which include the classical cnoidal wave as a special solution for a horizontal bottom. These equations may be transformed to a set of first-order quasi-linear hyperbolic equations with the characteristic curves in the x-t plane directly related to the bottom profile. To facilitate numerical computations they are then written as differential equations along the characteristics. In the third regime (c) of extremely small wave amplitudes the appropriate linearized equations are given. (Sinha-OEIS)
W74-01189

EFFECTS OF FRICTION AND SURFACE TIDE ANGLE OF INCIDENCE ON THE COASTAL GENERATION OF INTERNAL TIDES,
Washington Univ., Seattle. Dept. of Oceanography.
J. G. Weigand, H. G. Farmer, S. J. Prinsenberg, and M. Rattray, Jr.
Journal of Marine Research, Vol 27, No 2, p 241-259, May 15, 1969. 11 fig, 10 ref.

Descriptors: *Internal waves, *Boundary processes, *Friction, Mathematical models, *Waves (Water), Coasts, Tides.
Identifiers: Surface waves.

For the generation of internal waves by long surface waves, the normal-mode equations and solutions that satisfy the boundary conditions in a two-layer system are found analytically. Frictional effects decrease the amplitude of an internal wave over the shelf, changing it from a standing wave to a wave that progresses coastward and decreases the interference on the amplitude of the offshore progressive wave traveling seaward. Model studies, using a two-layer system of fresh water and saline water in a 9.9 m-long channel, gave favorable results relative to the theoretical results. (Sinha-OEIS)
W74-01190

A NOTE ON EDGE WAVES IN A STRATIFIED FLUID,
Massachusetts Inst. of Tech., Cambridge. Dept. of Mathematics.
H. P. Greenspan.
Studies in Applied Mathematics, Vol 49, No 4, p 381-388, December 1970. 2 fig, 6 ref. F44620-67-C-0007.

Descriptors: *Stratification, *Beaches, *Waves (Water), Equations, Density.
Identifiers: *Edge waves.

Ursell's solutions are generalized so that they apply to a stratified fluid in which the density increases exponentially with depth. Explicit solutions are given for edge waves on a sloping beach. The lowest mode, Stoke's edge wave, is found to be completely insensitive to the density field. Compared with the case of constant density, 'stratified' edge waves are found to exist in a much wider range of conditions. The higher modes show that previous restrictions on slope angle no longer apply. (Sinha-OEIS)
W74-01194

BEACH EQUILIBRIUM AND SECOND-ORDER WAVE THEORY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
D. R. Wells.
Journal of Geophysical Research, Vol 72, No 2, p 497-504, January 15, 1967. 3 fig, 16 ref, 2 append.

Descriptors: *Beaches, Equilibrium, *Waves (Water), *Sedimentation, *Coasts, *Sediment transport, Gravity waves.

The skewness of the probability distribution of the horizontal water velocity of second-order gravity waves is derived in order to investigate the stability of sand beaches. If the distribution is skewed toward the beach, sand may accumulate; whereas if it is skewed away from the beach, sand may be swept seaward. A neutral line is defined where the skewness is zero, and computation show that it cannot occur shoreward of the point where the depth-to-wavelength ratio is approximately 0.090. These results explain in a precise manner some observed beach equilibrium phenomena. (Sinha-OEIS)
W74-01201

LONG SURF,
Brown Univ., Providence, R.I. Div. of Applied Mathematics.
D. V. Ho, R. E. Meyer, and M. C. Shen.
Technical Report No. 4, March 1963. 17 p, 3 fig, 3 plates, 10 ref. ONR Nonr 562 (07), 562 (34).

Descriptors: *Surf, Mathematics, Models, *Waves (Water), *Beaches, *Coasts.
Identifiers: Breakers, Swell, Long surf.

A digest of a mathematical investigation on surf due to long swell is offered to present the assumptions and conclusions in a form usable by the experimental physicist. The results so far obtained are mainly qualitative, but quite detailed in some respects, and radically different from the results of earlier analyses. Some new observational material is also presented. It appears that a simple, non-linear model is capable of describing the essence of the whole phenomenon -- breaker formation, breaker collapse, run-up and back-wash -- for a quite representative type of surf. (Sinha-OEIS)
W74-01203

THE TRANSVERSE CIRCULATION NEAR A COAST,
Florida State Univ., Tallahassee. Dept. of Mathematics; and Florida State Univ., Tallahassee. Geophysical Fluid Dynamics Inst.
S. L. Blumsack.
Journal of Physical Oceanography, Vol 2, No 1, p 34-40, January 1972. 3 fig, 7 ref. NO0014-68-A-0159, NSF-GA-27560.

Descriptors: *Coasts, *Water circulation, *Boundary processes, Stratified flow, Rotational flow.
Identifiers: Length scale relationships, Transverse circulation.

The structure of the steady transverse circulation of a rotating stratified fluid on an f plane is analyzed in two stages. First, a length scale analysis is performed, giving the relationships between the vertical and horizontal length scales. Then an idealized problem in which there is an offshore Ekman transport near a coast is solved, giving the detailed structure of the transverse circulation. Boundary layer structures which decay algebraically are found from the formal solution. (Sinha-OEIS)
W74-01206

EDGE WAVES OVER A SLOPING BEACH IN A ROTATING TWO-LAYERED SYSTEM,
Florida State Univ., Tallahassee. Oceanographic Inst.
H. Iida, and T. Ichiye.
Prepared for Office of Naval Research. Technical Report No. 4, April 1963. 34 p, 5 fig, 2 tab, 13 ref, 1 append. ONR Nonr-988 (11).

Descriptors: *Beaches, *Slopes, Models, *Waves (Water), Currents (Water), *Shallow water, Sea level, Equations.
Identifiers: Edge waves, Geostrophic currents.

A mathematical analysis of a model describing edge waves over a sloping beach in a rotating two-layered system is described. It is assumed that geostrophic currents in the upper and lower layers have uniform velocities owing to the surface elevation increasing linearly from the coast. Though such an infinite uprise of sea level seems unrealistic, the waves considered have amplitudes significant only near the coast and the simplified model is justified. Slopes of surface and the interface are assumed so small that the approximation of hydrostatic pressure is valid as shown by Eckhart (1951). (Sinha-OEIS)
W74-01218

EXPERIMENTAL STUDY OF WAVE REFLECTION BY A SLOPING BEACH,
Tokyo Univ. (Japan). Ocean Research Inst.
K. Taira, and Y. Nagata.
Journal of the Oceanographical Society of Japan, Vol 24, No 5, p 242-252, October 1968. 15 fig, 7 ref.

Descriptors: *Beaches, *Coasts, *Waves (Water), Gravity waves, Energy loss, Slopes.
Identifiers: *Wave reflection, Phase difference.

Wave reflection by a sloping beach was studied with small-scale gravity waves in a small wave-tank 4 m long. The breaking of small-scale waves is much different from that observed on natural ocean beaches or in experimental tanks using large-scale waves. In a small tank, the waves lose their energy by generating capillary waves several millimeters in length at wave fronts near the shoreline. However, the dependence of the reflection coefficient on beach slope and on wave steepness are similar to those for large-scale waves, and the critical beach slope for wave breaking at a given deep wave steepness can be predicted by Miche's theory. The difference occurs only in the slope range just larger than the critical beach slope where the small-scale waves lose a significant amount of their energy without breaking. The capillary waves which are generated near the shoreline and propagate offshore seem to have an important role in this energy loss. The phase difference between the incident and reflected waves at the toe of the beach was also examined. The phase difference does not depend on wave steepness but depends on the ratio of wave length to beach length. The experimental results show that the phase differnce is proportional to kL for a wide range of kL. For small values of kL, the experimental values agree with the calculated values based on a simple model. (Sinha-OEIS)
W74-01223

AREAS OF POSSIBLE FLOODING IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01269

FLOW VISUALIZATION IN FREE SHEAR LAYERS,
Hong Kong Univ. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 08B.
W74-01271

BOUNDARY CONTRACTIONS AS CONTROLS IN TWO-LAYER FLOWS,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 08B.
W74-01276

LINEAR PROGRAMMING AND CHANNEL FLOW IDENTIFICATION,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 08B.
W74-01277

WAVE-INDUCED WATER PARTICLE MOTION MEASUREMENTS,
Naval Postgraduate School, Monterey, Calif.
R. F. Krapohl.
Available from NTIS, Springfield, Va., 22151, AD-756 577 Price $3.00 printed copy; $1.45 microfiche. M Sc Thesis, December 1972. 61 p, 6 fig, 4 tab, 19 ref.

Descriptors: *Waves (Water), *Ocean waves, *Model studies, *Movement, Flow rates, Depth, Velocity, Flow measurement, Current meters, Winds, Equations.
Identifiers: *Water particle motion, Wave-induced water, Wave spectra.

During June 8, 1972 records of orthogonal water particle velocity and instantaneous water elevation were measured at the Naval Undersea Research and Development Center (NUC) tower located approximately 1 mile off Mission Beach, California. Simultaneous measurements of wave height and two orthogonal water particle velocities were made at six elevations in 19 meters of water using a penetrating wave staff and an electromagnetic flowmeter. Moderate swell and low wind conditions prevailed during the experiment. The measured wave-induced velocities were 2%-4% greater than those predicted using linear wave theory. Coherence of the wave height and wave-induced velocities in the significant energy-density range was computed to be over 0.85, indicating that the motion was almost totally wave induced. At higher frequencies it was apparent that the motion was primarily turbulence. Phase spectra computed for the measured wave heights and orbital velocities compared very well with linear theory. Measured frequency distributions were compared to both Gaussian and Gram-Charlier distributions using the chi-squared goodness-of-fit test. Qualitatively, the Gram-Charlier distribution gave the better fit to the data. (Woodard-USGS)
W74-01285

ROTAMETER.
For primary bibliographic entry see Field 07B.
W74-01500

THERMAL STRATIFICATION IN INDUSTRIAL CANALS,
Louisiana State Univ., Baton Rouge.
A. M. Kamel.
Water Resour Bull. Vol 8, No 5, p 1018-1030. 1972, Illus.
Identifiers: *Canals, Industrial canals, *Thermal stratification, *Thermal diffusion equation, Temperature patterns.

A case study for the application of the thermal diffusion equation for the prediction of the temperature pattern in thermally stratified tidal canals is presented.--Copyright 1973, Biological Abstracts, Inc.
W74-01594

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT,
Geological Survey.
For primary bibliographic entry see Field 04A.
W74-01611

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME 2. HYDROLOGIC DATA MANAGEMENT,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
L. R. Beard.
Available from NTIS, Springfield, Va 22151 as AD-758 905 Price $3.00 printed copy; $1.45 microfiche. Report HEC-IHD-200, April 1972. 213 p, 11 fig, 6 tab, 12 ref.

Descriptors: *Water resources development, *Hydrologic data, *Data processing, *Computer programs, *Streamflow, Stochastic processes, Correlation analysis, Methodology, Runoff, International Hydrological Decade, Hydraulic engineering, Data storage and retrieval, Regional analysis.

This volume (vol 2) is part of a 12-volume report entitled, 'Hydrologic Engineering Methods for Water Resources Development,' prepared as part of the U.S. Army Corps of Engineers' participation in the International Hydrological Decade. Volume 2 describes methods and procedures for managing hydrologic data in a systematic manner, techniques for estimating missing portions of hydrologic records, and techniques for generating synthetic hydrologic data. A generalized computer program description, 'Monthly Streamflow Simulation,' is included. This program will analyze monthly hydrologic data at a number of interrelated stations, generate sequences of hypothetical hydrologic data, and reconstitute missing hydrologic data on the basis of concurrent data observed at other locations. (Woodard-USGS)
W74-01642

LONGSHORE CURRENT GENERATION BY OBLIQUELY INCIDENT INTERNAL WAVES,
Massachusetts Inst. of Tech., Cambridge.
N. G. Hogg.
Geophysical Fluid Dynamics, Vol 2, No 4, p 361-376, September 1971. 2 fig, 5 ref. Nonr 1841 (74) and Nonr 3963 (31).

Descriptors: *Internal waves, Shores, *Beaches, *Waves (Water), *Coasts, *Shallow water.
Identifiers: *Breaker zone, Vertical eddy motions, Longshore currents, Viscous stresses, *Internal gravity waves.

A significant longshore current of maximum amplitude v ± (30,000/v)cm/sec-1 (for typical oceanic values) can be forced between the breaker zone and shore by internal gravity waves obliquely incident on a plane beach. In the mean longshore momentum balance Reynolds stress terms appear which can be calculated to O (alpha), alpha being a bottom slope parameter, using a WKB approach. With appropriate assumptions being made about the amplitude behavior of the motion after breaking, the divergence of these stresses does not vanish and forces a current whose magnitude is determined by a balance with viscous stresses derived from vertical eddy motions. (Sinha - OEIS)
W74-01650

2F. Groundwater

PREDICTION OF WELL DEVELOPMENT POSSIBILITIES IN DELAWARE BY MEANS OF CALIBRATED GAMMA-RAY LOGS,
Delaware Geological Survey, Newark.
For primary bibliographic entry see Field 04B.
W74-01106

CALCULATION OF PERMEABILITY OF CRETACEOUS SANDSTONES FROM PUMPING AND STATIC LEVEL DATA IN SELECTED AREAS OF WESTERN SOUTH DAKOTA,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.
P. H. Rahn, and J. P. Gries.
Available from the National Technical Information Service as PB-225 128/8, $2.75 in paper copy, $1.45 in microfiche. South Dakota State University, Brookings. Water Resources Institute Completion Report, July 1973. 15 p, 9 fig, 11 ref. OWRR A-034-SDAK (1). 14-31-0001-3842.

Descriptors: *Permeability, Aquifer characteristics, *Aquifer testing, Wells, *South Dakota, Sandstones, Theis equation, Pumping.
Identifiers: Dakota Formation (SDak), Lakota Formation (SDak), *Cretaceous sandstones.

A pump test was conducted in the Dakota Sandstone at Wall, South Dakota, on October 7, 1972. Two observation wells responded to the pumping, and an average value of permeability was calculated to be 9.42 gpd/sq ft. No deviation from the Theis type curve was observed during the 44 hours of pumping at 120 gpm. A pump test was conducted on a new well at Box Elder, South Dakota, on July 6, 1972. The well was pumped at 110 gpm for 54 hours and the recovery was documented. The resulting calculation of permeability is 7.06 gpd/sq ft. (Wiersma-South Dakota)
W74-01113

DETERMINATION OF THE TOTAL STORAGE CAPACITY OF THE CRETACEOUS SANDSTONE AQUIFERS IN SOUTH DAKOTA,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.
J. P. Gries, W. J. Sick, and R. K. Baker.
Available from the National Technical Information Service as PB-225 122/1, $2.75 in paper copy, $1.45 in microfiche. South Dakota State University, Brookings, Water Resources Institute Completion Report, June 1973. 13 p, 6 fig, 17 ref. OWRR A-031-SDAK (1). 14-31-0001-3842.

Descriptors: *Porosity, *Water storage, *Sandstones, Aquifer characteristics, *South Dakota, Wells, Stratigraphy.
Identifiers: Dakota Formation (SDak), Fall River Formation (SDak), Lakota Formation (SDak), Newcastle Formation (SDak).

Sandstones were divided into three stratigraphic units; where Skull Creek Shale separates the Lakota and Fall River Formations from the overlying Newcastle-Dakota Formations formed two units, the third is east of the Skull Creek Shale pinchout where the formations merge into the Dakota Formation. Thicknesses of effective sandstone within each unit were determined from resistivity and spontaneous potential logs. Data from about 380 wells were used. An isopach map of effective sandstone thickness was prepared for each unit. Porosities of the effective sand units west of the Skull Creek zero line were determined from sonic and bulk density logs. Isoporosity maps were prepared using data from about 150 wells. By superimposing effective sand and porosity maps, a total volume of porosity figure was calculated. A total of 1.3 billion acre-feet of water storage capacity was determined for the Fall River-Lakota interval, and 977,800 acre-feet for the Newcastle-Dakota sandstones. East of the Skull Creek zero line, no sonic or bulk density logs were available. A porosity value of 25 percent was applied to the total thickness of effective sandstones, giving an estimated storage capacity of 360 million acre-feet for the sandstones of the Dakota Formation. (Wiersma-South Dakota)
W74-01114

RESERVOIR MECHANISM IN AN AQUIFER OF ARBITRARY BOUNDARY SHAPE,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
J. Eliasson, S. St. Arnalds, S. Johannsson, and S. P. Kjaran.
Nordic Hydrology, Vol 4, No 3, p 129-146, 1973. 10 fig, 1 tab, 4 ref.

Descriptors: *Groundwater movement, *Unsteady flow, *Mathematical models, Numerical analysis, Hydrogeology, Aquifer characteristics, Surface-groundwater relationships.
Identifiers: *Iceland.

Unsteady groundwater flow in an aquifer of limited horizontal extent and arbitrary boundary shape is described by a differential equation, the solution of which includes the solution of an eigenvalue problem by a numerical method. Boundary conditions are provided by nature in the form of watertight rocks, rivers, lakes or any kind of constant water level in hydraulic contact with the aquifer. The runoff behaves as a sum of flows through infinitely many linear reservoirs, corresponding to the eigen functions. The resulting equations for groundwater level and runoff discharge are sums of convolution integrals of the infiltration, an easy process to handle in a digital computer. The mathematical model derived was used to analyze the inflow into a water reservoir in Iceland from a nearby lava field. (Knapp-USGS)
W74-01129

BALANCE ESTIMATE OF GROUNDWATER RESOURCES ON THE NORTHWESTERN SLOPE OF THE CAUCASUS (BALANSOVAYA OTSENKA RESURSOV PODZEMNYKH VOD SEVERO-ZAPADNOGO SKLONA BOL'SHOGO KAVKAZA),
For primary bibliographic entry see Field 04B.
W74-01136

REGIONAL ESTIMATE OF BRACKISH- AND SALINE-GROUNDWATER YIELD (REGIONAL'NAYA OTSENKA EKSPLUATATSIONNYKH RESURSOV SOLONOVATYKH I SOLENYKH PODZEMNYKH VOD),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 04B.
W74-01137

PROBLEMS IN REGIONAL DYNAMICS OF ARTESIAN WATER (PROBLEMY REGIONAL'NOY DINAMIKI ARTEZIANSKIKH VOD),
M. R. Nikitin.
Vodnyye Resursy, No 2, p 199-202, 1973. 5 ref.

Descriptors: *Conferences, *Confined water, *Artesian aquifers, Artesian heads, Pressure, Pressure head, Hydrodynamics, Groundwater movement.
Identifiers: *USSR, Artesian basins, Tectonics.

An interdepartmental All-Union conference devoted to regional dynamics of artesian water and hydrodynamics of deep zones of artesian basins was held in Leningrad November 28-December 1, 1972. Conference participants included more than 350 delegates from approximately 60 scientific institutes, industrial organizations, and educational establishments. Twenty of the 116 papers of the conference were presented at two plenary sessions and the remaining papers were presented at sectional meetings. Among the topics discussed were: regional dynamics of artesian basins in ancient and recent platforms and folded-mountain regions; relation between vertical and lateral movement of groundwater;role of tectonic factors; origin of anomalously high and low groundwater pressure heads; contribution of folded-mountain structures to the alimentation of deep artesian horizons; and new proposals for the classification of artesian basins. (Josefson-USGS)
W74-01141

HYDROGEOLOGIC CHARACTERISTICS OF THE VALLEY-FILL AQUIFER IN THE WELDONA REACH OF THE SOUTH PLATTE RIVER VALLEY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 04B.
W74-01142

GROUND-WATER YIELD POTENTIAL IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01147

SENSITIVITY OF GROUNDWATER FLOW MODELS TO VERTICAL VARIABILITY OF AQUIFER CONSTANTS,
Oklahoma State Univ., Stillwater. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W74-01151

DRAWDOWN AT TIME-DEPENDENT FLOWRATE,
Wisconsin Univ., Milwaukee. Coll. of Applied Science and Engineering.
R. Y. Lai, G. M. Karadi, and R. A. Williams.
Water Resources Bulletin, Vol 9, No 5, p 892-900, October 1973. 3 fig, 7 ref.

Descriptors: *Drawdown, *Groundwater movement, Withdrawal, Acquifers, Water yield, Water level fluctuations, Equations, Discharge (Water), Unsteady flow, Artesian aquifers, Artesian wells.

The exact solution for the drawdown in and around a well in a homogeneous, isotropic, and confined aquifer is presented for well discharge as a function of time. The effect of the storage capacity of the well is also taken into consideration. Two types of flow rate functions are studied, namely linear and exponential functions, and the results are plotted in graphs. A nonflowing well of finite diameter in a homogeneous, isotropic confined aquifer of uniform thickness is considered under the assumption that the well screen penetrates the entire artesian aquifer. (Knapp-USGS)
W74-01155

MINERAL RESOURCES, GEOLOGICAL STRUCTURE AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01166

A DISTRIBUTED HYDROLOGICAL MODEL BASED ON THE CONCEPT OF GROUNDWATER RECHARGE, TRANSMISSION, AND DISCHARGE,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
D. W. Lawson.
J Hydrol (Dunedin). Vol 10, No 2, p 133-140. 1971. Illus.
Identifiers: Discharge, Equations, *Groundwater recharge, *Hydrological models, Model studies, Moisture zone, Recharge, Soils, Transmission, *Groundwater movement.

A conceptual model is proposed which is distributed on the basis of groundwater flow systems. The fundamental unit of the model is a vertical section in which 4 groundwater regions are distinguished: a recharge region, a transmission region, a discharge region and a bank storage region. Each region is subdivided into a groundwater zone and a soil moisture zone. The storage and transmission equations are formulated, and a procedure is outlined for routing precipitation through the model.--Copyright 1973, Biological Abstracts, Inc.
W74-01233

AREAS WITH ABUNDANT SINKHOLES IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01270

GEOTHERMAL RESOURCE INVESTIGATIONS,
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 04B.
W74-01273

NUMERICAL SOLUTION OF MULTIPHASE WELL FLOW,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Ground-Water Hydrology.
For primary bibliographic entry see Field 08B.
W74-01275

CONTRIBUTION TO PHYSICOCHEMICAL STUDY OF SOME SPRINGS OF THE GAPEAU RIVER BASIN (VAR),
For primary bibliographic entry see Field 02K.
W74-01288

STORAGE AND RETRIEVAL OF GROUNDWATER DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W74-01291

RECOGNITION OF NATURAL BRINE BY ELECTRICAL SOUNDINGS NEAR THE SALT FORK OF THE BRAZOS RIVER, KENT AND STONEWALL COUNTIES, TEXAS,
Geological Survey, Washington, D.C.
A. A. R. Zohdy, and D. B. Jackson.
Available from GPO, Washington, D C 20402, Price 40 cents postpaid or 30 cents GPO Bookstore. Professional Paper 809-A, 1973. 14 p, 13 fig, 19 ref.

Descriptors: *Saline water-freshwater interfaces, *Subsurface waters, *Texas, Analytical techniques, Electrical resistance, Sounding, Depth, Sound waves, Hydrogeology data collections, Instrumentation, Geology, Groundwater movement.
Identifiers: *Kent County (Tex), *Stonewall County (Tex), Electrical sounding, Salt springs, Seeps.

Fifteen electrical soundings were made near the Salt Fork of the Brazos River in Texas using the Schlumberger and equatorial electrode arrays to evaluate the usefulness of the direct-current resistivity method in determining the depth of a freshwater-saltwater interface in a geologic setting containing gypsum and anhydrite layers. The sounding data were interpreted by curve matching and computer modeling, and indicate that the resistivity method is useful where the interface lies above the gypsum series and also where the effective relative conductance of the brine-saturated layers below the gypsum layers is large. This type of successful application was obtained from soundings made near the town of Jayton and also in an area approximately 7 miles west of Aspermont. Near the town of Girard, the freshwater-saltwater interface was difficult to detect because of the presence of high-resistivity anhydrite beds that lie directly beneath the interface. In the immediate vicinity of Aspermont and north of Old Glory, preliminary interpretation of the sounding data indicates the presence of brackish- to freshwater-saturated sedimentary rocks. (Woodard-USGS)
W74-01370

STUDY OF THE SPEED OF WATER CIRCULATION IN A WATER-BEARING LIMESTONE DEPOSIT BY TRACING TESTS (LA SERRIERE RIVER BASIN/NE),
Neuchatel Univ. (Switzerland). Centre de Hydrogeologie.
B. Mathey, and G. Simeoni.
Bull Soc Neuchatel Sci Nat. 95. p 173-180, 1972, Illus, English summary.

Identifiers: *Circulation, *Limestone deposits, River basins, *Switzerland (La Serriere River basin), *Tracing tests.

Repetition of a coloring test clearly shows the influence of the hydrological state of the nappe upon the filtration rate of water. Fissuration and hydraulic gradient determine the circulation rate of water.--Copyright 1973, Biological Abstracts, Inc.
W74-01563

UNDERGROUND STORAGE OF TEXAS PLAYA LAKE WATERS BY INJECTION INTO THE OGALLALA FORMATION UNDER MODERATE PUMP PRESSURE,
Texas Tech Univ., Lubbock.
For primary bibliographic entry see Field 04B.
W74-01627

2G. Water in Soils

TRANSIENT MOVEMENT OF WATER AND SOLUTES IN UNSATURATED SOIL SYSTEMS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
A. K. Tyagi, D. D. Evans, H. K. Qashu, and A. W. Warrick.
Available from the National Technical Information as PB-225 119/7, $3.00 in paper copy, $1.45 in microfiche. Project Completion Report, September 1973. 31 p, 15 fig, 2 tab, 3 ref. OWRR B-020-ARIZ (4). 14-31-0001-3555.

Descriptors: *Soil water movement, *Finite element analysis, *Solutes, *Salts, Dispersion, *Soil moisture, Simulation analysis, Infiltration, Drainage.
Identifiers: *Unsaturated soil.

The movement of moisture content and dispersion of salts in unsaturated groundwater systems were studied. The subject was studied as both a hydrologic phenomenon and as a dispersion phenomenon caused by the quantity and the rate of application of water, together with solutes. From theoretical considerations, equations were derived to predict the moisture contents and the concentrations as a function of time and space. Finite element solutions were obtained for a composite system of moisture content and water quality. The generalized programs are capable of simulating and predicting the transport and distribution of solutes in water, under a variety of boundary conditions in the field and laboratory. In order to verify the simulation process of the developed numerical models, laboratory experiments were conducted. Natural soils, coarse sand, and fine sand were used as porous media in the column experiments. In the column, ten stations at 10-centimeter depth intervals were fixed for observation of moisture content, suction head, and concentration of solute in the water. Ten experiments for the infiltration and drainage conditions were performed. The observed data on moisture content and concentration for one-dimensional cases are in agreement with the finite element solutions.
W74-01104

STRATIGRAPHY AND ECONOMIC GEOLOGY OF THE COASTAL PLAIN OF THE CENTRAL SAVANNAH RIVER AREA, GEORGIA,
Georgia Univ., Athens. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-01122

SOIL ASSOCIATION MAP OF KNOX COUNTY, TENNESSEE.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01146

PHYSICAL PROPERTIES OF SOME VOLCANIC-ASH DERIVED SOILS OF THE HIGHLANDS OF PASTO, NARINO, COLOMBIA, (IN SPANISH),
Narino Univ., Pasto (Colombia). Facultad de Ciencias Agriculturas.
G. Escovar, R. Jurado, and Ricardo Guerreo R.
Turrialba. Vol 22, No 3, p 338-346. 1972. Illus. (English summary).
Identifiers: *Colombia (Pasto Highlands), Density, Highlands, Index, Plasticity, Porosity, Soils, Stability, Texture, *Volcanic ash, *Soil physical properties.

Determinations were made on texture, densities, porosity, plasticity, water stability of aggregates and humidity retention capacity (humidity critical points). The soils presented dominance of sand and silt over clay. Porosity and retention capacity of humidity were very low and apparent density very high in comparison with those obtained from volcanic soils of Latin America, USA and Japan. Their plasticity index was relatively low and their aggregation ratio very high. Apparently, the soils from the Altiplano of Pasto have not reached the development of the typical 'andosol.' Studies of statistical correlation indicated that organic matter markedly influences most of the physical properties studied. It increased porosity, aggregation and humidity retention capacity and it decreased plasticity.--Copyright 1973, Biological Abstracts, Inc.
W74-01228

EFFECT OF PUDDLING ON PHYSICAL PROPERTIES OF RICE SOIL,
Fertilizer Corp. of India, Sindri. Planning and Development Div.
For primary bibliographic entry see Field 03F.
W74-01246

EFFECT OF THE QUALITY OF WELL WATERS ON SOILS IN GURGAON DISTRICT,
Haryana Agricultural Univ., Hisser (India). Dept. of Soils.
H. R. Manchanda, and J. S. Kanwar.
Haryana Agric Univ J Res. Vol 1, No 2, p 1-10, 1971.
Identifiers: Adsorption, *Electrical conductivity, *India (Gurgaon district), Irrigation, Sodium, Soils, *Well water, Water quality, *Soil chemical properties.

Palwal and Bawal, Na percentage and Na/Ca + Mg ratio increased with soil depth in soils irrigated by the B-category (bad) waters, whereas, the reverse was true in soils receiving the A-category (good) waters. The electrical conductivity was maximum at 0-15 cm and minimum at 15-30 cm soil depth, irrespective of the quality of irrigation water. The A-category waters of Gurgaon and Nuh had about 2 times more electrical conductivity (EC) than the B-category waters, but their continuous use did not increase the salt content of the soil. The A-category waters of these soils were the best for irrigation purposes, because of high NO3 and K content particularly for the light textured soils. Significant correlations were obtained between the EC and Na adsorption ratio (SAR) of irrigation waters and the soils irrigated. SAR of water was also significantly associated with the exchangeable Na percentage (ESP), SUGGESTED THAT THE EC and SAR of irrigation water were good indices for predicting salt and Na accumulation in soil.--Copyright 1973, Biological Abstracts, Inc.
W74-01252

SOIL AERATION RESPONSE TO DRAINING INTENSITY IN BASIN PEAT,
Northern Forest Research Center, Edmonton (Alberta).
J. C. Lees.
Forestry (Oxf). Vol 45, No 2, p 135-143. 1972, Illus.

Identifiers: *Aeration, Draining, Forestation, *Oxygen diffusion, Peat, Pinus-Contorta-Var-Latifolia, Polarography, *Scotland (Flanders Moss), *Soil aeration.

Improvement in soil aeration was assessed following draining to a range of intensity on a peatland afforestation project at Flanders Moss in Central Scotland. A polarographic technique was used to measure O2 diffusion rates in the rooting zine of lodgepole pine (Pinus contorta Dougl. var. latifolia Engelm.) planted in 1965 on plowed furrows. There were soil aeration differences because of draining intensity. Below the planting turf O2 diffusion rates rapidly decreased and tree rooting was restricted to the surface layers. Aeration was found to be closely correlated with depth of water in boreholes which provide a simple and reliable index of response to draining. O2 diffusion rate was a more sensitive means of assessing soil aeration than oxidation-reduction potential at the low O2 concentrations encountered in the basin peat on the Moss.--Copyright 1973, Biological Abstracts, Inc.
W74-01255

MICRODETERMINATION OF CHLORO--S-TRIAZINES IN SOIL BY GAS-LIQUID CHROMATOGRAPHY WITH NICKEL ELECTRON CAPTURE OR ELECTROLYTIC CONDUCTIVITY DETECTION,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 05A.
W74-01304

PHYSICAL EDAPHOLOGY. THE PHYSICS OF IRRIGATED AND NONIRRIGATED SOILS,
S. A. Taylor.
W. H. Freeman and Co.: San Francisco, Calif., 1972. (Revised and edited by G. L. Ashcroft). 533 p, Illus. Pr. $17.50.
Identifiers: Atmosphere, *Edaphology, Energy, *Irrigated soils, *Nonirrigated soils, *Soil physical properties.

The interactions of soil physical processes and conditions with the atmospheric environment and the growing plant are discussed. Subjects include the foundations of irrigation science, climatic factors and evapotranspiration, the physical properties of water, the colloidal system, the soil solids, energy relations of soil water, water movement, measurement, retention and flow in field soil. Soil structure, aeration and temperature and irrigation are discussed. Appendixes containing dimensions and units for physical quantities, conversion factors and values for selected physical constants are included.--Copyright 1973, Biological Abstracts, Inc.
W74-01572

A RELIABLE AND INEXPENSIVE SOIL FROST GAGE,
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
B. O. Wilen, W. P. MacConnell, and L. F. Michelson.
Agron J, Vol 64, No 6, p 840-841, 1972.
Identifiers: Electrical resistance, *Frost, *Gages, Gypsum, Resistance, *Soil frost gages, Instrumentation.

The fabricated gypsum electrical resistance blocks proved their reliability as soil frost measuring devices. The difference in the electrical resistance between frozen and unfrozen soil is great enough to give a reliable indication of whether or not the soil is frozen. The blocks measure the physical state of the soil water inside them, independent of the temperature of the soil water in the blocks. The blocks will measure subsurface frost when the surface soil is unfrrozen. Since the blocks are small, they respond quickly to freezing and thawing of a relatively limited test area. The fabricated gypsum electrical resistance blocks should be of great value in frost measurement because the units are inexpensive, easy to construct, and last at least 2 yr in field use.--Copyright 1973, Biological Abstracts, Inc.
W74-01574

EFFECT OF PORTLAND CEMENT ON SOIL AGGREGATION AND HYDRAULIC PROPERTIES,
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.
L. R. Ahuja, and D. Swartzendruber.
Soil Sci, Vol 114, No 5, p 359-366, 1972, Illus.
Identifiers: *Cement (Portland), Diffusivity, *Hydraulic properties, *Soil aggregation, Water.

The effect of addition of small quantities of portland cement on the water-stable aggregates, the saturated hydraulic conductivity, the soil-water characteristic, and the unsaturated soil-water diffusivity of a silt loam soil are evaluated. Cement was intimately mixed with air-dry soil at a rate of 0.475%, 0.95% or 1.90% by weight, and the mixture was kept in moist condition for 32 hr, 7 days, 14 days or 28 days. The aggregate indicated a beneficial effect of cement application increasing with the rate and the duration of moist-curing. The amount of water-stable aggregates in the cement-treated soil increased as much as 3-fold, and the aggregation index increased as much as 8-fold, as compared with the moist-cured no-cement control. Most of the beneficial effect was achieved with 1% cement and 14 days duration of moist-curing. The saturated hydraulic conductivity of the treated samples was not much different from that of the control initially, but as the water flow continued for 12 hr the conductivity of the control decreased to 1/2 its initial value while the conductivities of the treated samples slightly increased. The water-retention curve measured for the soil treated with 1.90% cement showed a small decrease in the water retained between 50 cm and 200 cm suctions. The unsaturated soil-water diffusivity of the treated sample was practically the same as that of the control.--Copyright 1973, Biological Abstracts, Inc.
W74-01576

NITRATE REDUCTION IN SOILS: EFFECT OF SOIL MOISTURE TENSION,
Louisiana State Univ., Baton Rouge.
L. Pilot, and W. H. Patrick, Jr.
Soil Sci. Vol 114, No 4, p 312-316. 1972. Illus.
Identifiers: Moisture, *Nitrate reduction, Potential, Redox, Reduction, *Soil moisture tension, Soils, *Mississippi, *Soil aeration.

Nitrate reduction was very marked in the low moisture tension range for the 3 Mississippi River, alluvial soils studied, especially during the first 36-48 hrs of incubation. Critical moisture tension values specific to each soil were observed at which a small decrease in moisture tension caused a sharp increase in the rate of nitrate reduction. At tensions above these critical values (about 20 cm for the Crevasse soil and between 30 and 40 cm for both the Commerce and Mhoon soils) no nitrate loss occurred. The effect of moisture tension was in governing the air-filled porosity of the soil which in turn regulated the aeration of the soil. The critical values of air-filled porosity were 11% in the Crevasse soil, 12% in the Commerce soil and 14% in the Mhoon soil. Air-filled porosities this high and higher allowed oxygen to diffuse completely through the soil cores, kept the redox potential at high values and prevented nitrate loss. A very small amount of oxygen completely penetrating the soil core was sufficient to prevent dentrification. There was no evidence of nitrates being reduced under aerobic conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-01583

DESORPTION AND DISSOLUTION OF SALTS FROM SOILS AS A FUNCTION OF SOIL WATER RATIO,
Goettingen Univ. (West Germany). Inst. of Soil Science and Food Nutrition.
B. Ulrich, and P. K. Khanna.
Soil Sci. Vol 114, No 4, p 250-253. 1972. Illus.
Identifiers: Desorption, Dissolution, *Salts, *Soil water ratio, Soils, *Cation concentration (Soil), Adsorption.

In 4 soils of low C content and different pH, the concentrations of the different cations in the soil solution were determined at solution volumes of 0.27-20 ml/g after equilibrating for 24 hr. Up to solution volumes of 0.6-0.8 ml/g soil, the cation concentration in the soil solution is determined by salt desorption; at higher solution volumes dissolution processes are governing. The salt adsorption in the 4 soils amounts to around 2 micro eq/g clay plus silt. The lower the intensity of the exchangeable binding of a cation, the greater is its fraction, which is present not in exchangeable but in adsorbed form. Due to the existence of adsorbed salt in soils, exchangeable cation determination bears a systematic error. Equilibrium soil solution should be taken only from samples with solution volumes less than 0.6-0.8 ml/g soil.--Copyright 1973, Biological Abstracts, Inc.
W74-01604

SYSTEM OF TREATING IRRIGATED SOIL WHICH IS SOWN WITH SUGAR BEETS, (IN RUSSIAN),
For primary bibliographic entry see Field 03F.
W74-01606

SOIL AND WATER CONSERVATION ON ARABLE LANDS,
Soils Inst., Tehran (Iran). Soil and Water Conservation Div.
For primary bibliographic entry see Field 03F.
W74-01633

DISTRIBUTION PATTERNS AND POPULATION DYANMICS OF THE MICRO--ARTHROPODS OF A DESERT SOIL IN SOUTHERN CALIFORNIA,
Westfield Coll., London (England). Dept of Zoology.
For primary bibliographic entry see Field 02I.
W74-01635

STUDY OF SOIL PLASTICITY OVER A WIDE RANGE OF SOIL MOISTURE CONTENTS,
Azove-Chernomorskii Selskokhozyaistvennyi Institut, Rostove-na-Donu (USSR).
M. B. Minkin, A. G. Kalmykov, and N. I. Buravchuk.
Soviet Soil Science, Vol 4, No 5, p 600-604, 1972. 1 fig, 1 tab, 11 ref. Translated from Pochvovedeniye, No 10, p 121-125, 1972.

Descriptors: *Soil mechanics, *Soil water, *Plasticity index, *Soil properties, *Soil moisture, Model studies, Plasticity, Moisture content.

Plasticity is usually understood to mean the capacity of a system to deform without rupture if the shear stress exceeds the ultimate shear stress and retains the new shape when the load is removed. The difference in water content between the upper and lower plastic limits (1.e. the plastic number) is extremely important for developing scientific methods of working the soil and for describing the mechanical properties of soils. The soil plasticity index developed by Volarovich was studied over a wide range of moisture contents. This index (ratio of ultimate shear stress to plastic viscosity) is a very objective method which can describe the plastic properties of a system, not only at separate boundary points, but over the entire range of soil moisture content variations. It

was discovered that the plastic number, which has a strictly physical basis, most accurately reflects the structural mechanical properties of soils at the plastic limits. Solonetz soils, typically halomorphic in character, and found in arid regions, are included in the sampling. (Black-Arizona)
W74-01636

2H. Lakes

THE DISTRIBUTION, COMPOSITION AND BIOMASS OF THE CRUSTACEAN ZOOPLANKTON POPULATION IN WESTERN LAKE SUPERIOR,
Wright State Univ., Dayton, Ohio. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05C.
W74-01109

COASTAL PROCESSES AND BEACH DYNAMICS AT SHEBOYGAN, WISCONSIN, JULY, 1972,
Williams Coll., Williamstown, Mass.
W. T. Fox, and R. A. Davis, Jr.
Available from NTIS, Springfield, Va., 22151 as AD-760 348 Price $3.00 printed copy; $1.45 microfiche. Technical Report No 10, April 3, (1973). 94 p, 35 fig, 23 ref, 3 append. ONR-GP Contract N00014-69-C-0151.

Descriptors: *Stroms, *Weather patterns, *Great Lakes, Data collections, Model studies, Winds, Waves (Water), Fog, Shores, Currents (Water), Upwelling, *Lake Michigan, Weather forecasting, Meteorological data, *Wisconsin.

During July 1972, a field study was conducted near Sheboygan, Wisconsin on the western shore of Lake Michigan to contrast coastal processes when storms move offshore with those encountered when storms move onshore on the eastern side of the lake. During the summer, the storms generally follow a path from west to east across the Great Lakes. Southwest winds build up the highest waves and strongest longshore currents on the east side of the lake. Winds from the south, blowing along the western shore, result in upwelling of cold water on the western side of the lake. The seabreeze effect is much stronger and fog more common along the western shore. The study area had a sinuous shoreline with a wavelength of 1000 feet and an amplitude of 30 feet. Crescent-shaped bars enclosing troughs approached the shore at the horns of the crescent. During high wave energy, the bars migrated within the study area, but the same general nearshore pattern was maintained. A computer simulation model was developed for the eastern shore of Lake Michigan which will be tested and modified for the western shore. (Woodard-USGS)
W74-01130

CHEMICAL RELATIONSHIPS BETWEEN SURFACE WATER AND THE GROUND IN SOUTH FLORIDA,
Miami Univ., Coral Gables, Fla.
For primary bibliographic entry see Field 02K.
W74-01153

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
National Oceanic and Atmospheric Administration, Rockville, Md.

International Field Year for the Great Lakes Bulletin No 7, July 1973. 91 p, 13 fig, 8 tab.

Descriptors: *Hydrologic data, *Great Lakes, *International waters, *Canada, *United States, International Hydrological Decade, Surface waters, Erosion, Groundwater, Meteorological data, Climatology, Water temperature, Remote sensing, Aerial photography, Weather patterns, Winds, Humidity, Bathymetry, Aircraft, Ships, Data collections, Methodology, Instrumentation.

This bulletin summarizes data collected by Canada and the United States as part of the International Field Year For The Great Lakes (IFYGL) program. The data submitted by Canada are: groundwater erosion along part of the north shore of Lake Ontario (IFYGL Project 38 TW); analysis of energy fluxes by aerodynamic methods (IFYGL Project 44 BL); meteorological buoy measurements (IFYGL Project 97 BL); determination of temperature and current climatology relevant to cooling water intake locations for the proposed Ontario Hydrogenerating Stations (IFYGL Project 110 WM); A.R.T. surveys of Lake Ontario summary of flight operations (IFYGL Project 16 ME); bathymetric survey of Lake Ontario and positioning system evaluation (IFYGL Project 79 F); and wind temperature and humidity fluctuations (IFYGL Project 75 BL). The data submitted by the United States are: comments by the U.S. Director; U.S. scientific program--tawks, project areas; operations and data acquisition systems; data management--physical data collection system data, rawinsonde data; and IFYGL rawinsonde system operation. (Woodard-USGS)
W74-01162

PRODUCTION OF CRUSTACEAN ZOOPLANKTON IN MOTY BAY, LAKE JEZIORAK: THE METHOD OF PRODUCTION ESTIMATION,
Nicolas Copernicus Univ. of Torun, Ilawa (Poland). Dept. of Hydrobiology.
W. Zawislak.
Pol Arch Hydrobiol. Vol 19, No 2, p 179-191. 1972. Illus.
Identifiers: *Crustacean zooplankton, Lakes, Methodology, Plankton, *Poland (Lake Jeziorake), *Winberg formulas, *Production.

Formulas of Winberg et al. (1965) for estimation of net production of crustacean zooplankton were modified which account for the changes in biomass increase of animals hatching from eggs and transformed into individuals of successive stages before the lapse of the period T for which production is estimated. (See also W74-01173)--Copyright 1973, Biological Abstracts, Inc.
W74-01172

PRODUCTION OF CRUSTACEAN ZOOPLANKTON IN MOTY BAY, LAKE JEZIORAK: II. ESTIMATION OF PRODUCTION OF THE PREDOMINATING SPECIES,
Nicolas Copernicus Univ. of Torun, Ilawa (Poland). Dept. of Hydrobiology.
W. Zawislak.
Pol Arch Hydrobiol. Vol 19, No 2, p 193-202. 1972. Illus.
Identifiers: *Crustacean zooplankton, Lakes, Methodology, Plankton, *Poland (Lake Jeziorak), *Production, Species, *Winberg formulas, Zooplankton.

Crustacean zooplankton production was estimated during 5 mo. (May 2-Nov. 7, 1969) in a shallow and slightly eutrophized Bay Moty, Lake Jeziorak, Poland. Production was computed by 2 methods: Winberg et al. (1965), and Winberg's method modified by Zawislak (1972). The modified method gave higher values of production of the investigated species. (See also W74-01172)--Copyright 1973, Biological Abstracts, Inc.
W74-01173

A PROFILE OF THE FOUR MOMENT MEASURES PERPENDICULAR TO A SHORE LINE, SOUTH HAVEN, MICHIGAN,
Williams Coll., Williamstown, Mass.
W. T. Fox, J. W. Ladd, and M. K. Martin.
Journal of Sedimentary Petrology, Vol 36, No 4, p 1126-1130, December 1966. 2 fig, 1 tab, 5 ref.

Descriptors: *Lake Michigan, *Sediment transport, Sand bars, *Energy, *Topography, *Statistics, Environments, *Beaches, *Waves (Water), *Coasts.
Identifiers: Nearshore processes.

A series of fourteen samples was taken along a profile crossing a beach, berm, foreshore slope, plunge point, nearshore, offshore bar, and offshore area to study the changes in the first four moments. The mean grain size and standard deviation reached a maximum in the plunge zone and were also high on the offshore bar. Skewness and kurtosis values were highest in the nearshore and offshore area. The beach represents a phi normal distribution of fine sand which is mixed with varying amounts of coarser material to form the sediments in the other environments. The four moments reflect the bottom topography and the dissipation of wave energy across the profile. The wave energy is first released on the sand bar where the waves break and move into the nearshore area. The bottom profile in the nearshore area is concave upward, representing equilibrium conditions for the waves encountered. In the nearshore area the waves form again but are smaller because of the energy spent in breaking on the offshore bar. The waves once again break at the plunge point, creating an area of maximum turbulence and release of energy. A traverse of closely spaced samples across a shore line is quite effective in interpreting the effects of both wave-energy dissipation and topographic profile on sand-size distribution. The four moments should be considered together in making the final interpretation of the energy profiles. (Sinha-OEIS)
W74-01184

SHIFTING OFFSHORE BARS AND HARBOR SHOALING,
United States Lake Survey, Detroit, Mich.
For primary bibliographic entry see Field 02J.
W74-01191

NOTES ON THE DYNAMICS OF THE REPRODUCTIVE ACTIVITY OF ARCTODIAPTOMUS BACILLIFER IN HIGH ALTITUDE ALPINE LAKES,
Parma Univ. (Italy). Istituto di Zoologia e Anatomia Comparata.
I. Ferrari.
Boll Zool. Vol 38, No 3, p 221-225. 1971. Illus.
Identifiers: *Alpine lakes, Altitude, *Arctodiaptomus-bacillifer, *Italy (Bognanco Valley), Lakes, Reproduction, *Diaptomids, Zooplankton.

Zooplankton samples were periodically collected from 3 Alpine lakes in the Bognanco Valley (Piedment, Italy), i.e., Campo 2, 3 and 4 lakes, for 2 yr, 1968 and 1969, during the summer and autumn when the waters are ice free. The dynamics of the zooplankton populations, and principally of A. bacillifer, which is the ecologically dominant species in the zooplankton biocoenosis of all 3 lakes, was studies. In particular, the seasonal variations of mean clutch size of Diaptomids were considered.--Copyright 1973, Biological Abstracts, Inc.
W74-01209

CURRENTS AT TOLEDO HARBOR,
United States Lake Survey, Detroit, Mich.
G. S. Miller.
In: Proceedings 11th Conference Great Lakes Research, Milwaukee, Wisconsin, 1968. p 437-453, (1968), 17 fig, 8 ref.

Descriptors: *Ohio, *Currents (Water), *Wind tides, *Seiches, Surface waters, *Lake Erie.
Identifiers: *Toledo Harbor (Ohio), River discharge.

An investigation of currents at Toledo Harbor, Ohio, was conducted from May through November 1966 using Eulerian and Lagrangian

techniques. The driving forces producing currents in the harbor are wind tides, seiches, and river discharge. The current is a reversing type except during periods of high river outflow. Speed histograms indicate that about 10% of the time the current speed is greater than 15 cm/sec. Spectral analysis of current speed shows that the peaks correspond to the modes of the seiche. Drogue tracks indicate that the mid-channel current is up to 2.5 times greater than that recorded near the channel edge. Opposing currents are occasionally observed because of wind induced surface currents. (Sinha-OEIS)
W74-01214

SOME SOURCES OF ERROR IN THE 14C METHOD FOR ESTIMATING PRIMARY PRODUCTIVITY AND THEIR RELATIONSHIP TO LIGHT INTENSITY DURING INCUBATION,
Kyoto Univ., Otsu (Japan). Otsu Hydrobiological Station.
M. Nakanishi, and F. J. Ward.
Jap J Limnol. Vol 32, No 4, p 85-89. 1971. Illus.
Identifiers: *Carbon-14 method, *Error, Incubation, Intensity, *Japan (Lake Biwa), Light, Methodology, *Primary productivity, Lakes.

Losses in primary productivity estimates caused by desiccation of filters at Lake Biwa, Japan, ranged from 18-52% and were inversely related to the natural logarithms of light intensities during incubation. Losses caused by preservation were variable, depending on filter treatment and radioactivity counting method, but were high in scintillation determinations. Significant fractions of total differences between primary productivity estimates from liquid scintillation counts of immediately filtered wet filters and Geiger-Muller counts of immediately filtered dry filters were associated with over-estimating the relative activity of the C-14 stock solution (from 15-24%). In view of these and other causes for underestimating primary productivity, the 14C method requires further examination.--Copyright 1973, Biological Abstracts, Inc.
W74-01217

BATRACHOSPERMUM VAGUM AG. IN THE SZCZECIN POMERANIA, A LOCALITY NEW TO POLAND, (IN POLISH),
Wyzsza Szkola Rolnicza, Szczecin (Poland). Katedra Botaniki.
W. Kowalski.
Fragm Florist Geobot (Krakow), Vol 17, No 1, p 163-169. 1971. Illus. English summary.
Identifiers: *Batrachospermum-vagum, Desmidiaceae, *Dystrophy, Ecology, *Menyanthes-trifoliata, Oligotrophy, *Poland (Czarcie Lake), Lakes Peat bogs.

It is the 4th locality in Poland, and the 3rd in Pomerania in which this freshwater seaweed has been found. Czarcie Lake is a rather small dystrophic water body situated in the forest; plant succession series can be studied in it from the open water table to the phytocenoses of the raised peat-bog. B. vagum occurs most abundantly in association with Menyanthes trifoliata. It is accompanied by other oligotrophic species, especially Desmidiaceae.--Copyright 1973, Biological Abstracts, Inc.
W74-01219

INVESTIGATIONS ON THE CHANGES IN THE CONTENT OF HEAVY METALS IN LAKE WATERS OF THE MASURIAN LAKE DISTRICT,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowa (Poland). Instytut Hydrobiologii Ochrany Wodnego.
For primary bibliographic entry see Field 05B.
W74-01221

LIMNOLOGY AND FISHERY BIOLOGY OF BLACK LAKE, NORTHERN SASKATCHEWAN,
Saskatchewan Dept. of Natural Resources Saskatoon. Fisheries Wildlife Branch.
R. P. Johnson.
Sask Dep Nat Resour Fish Wildl Branch Fish Rep. 9. p 6-46. 1971. Illus.
Identifiers: Biology, *Canada (Black Lake-Sask.), *Fauna, Fish, *Fishery, Lakes, Limnology, Vegetation, Geochemical properties.

Geochemical properties, vegetation, fauna and commercial fish species of this Canadian lake are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-01234

SWEDISH LAKE RESTORATION PROGRAM GETS RESULTS,
Lund Univ. (Sweden). Limnological Inst.
For primary bibliographic entry see Field 05G.
W74-01262

OXBOW CUT-OFF BOG LAKE ZOOPLANKTON OF THE KOLYMA BASIN (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Ichthyology.
E. A. Streletskaya.
Vestn Mosk Univ Ser 6 Biol Pochvoved, Vol 27, No 3, p 12-19, 1972, Illus, English summary.
Identifiers: Bogs, *Cladoceran, *Copepod, Lakes, Plankton, *USSR (Kolyma basin), *Zoo plankton.

Seasonal dynamics of species composition, biomass and population density of zooplankton were investigated. In June and Oct. copepods dominated in zooplankton, biomass was low (1.70-0.67 g/m3) and population density was average (37.63-35.25 thousands of individuals per 1 m3). In July, Aug. and Sept. cladocerans dominated in zooplankton, biomass was high (10.40-12.99 g/m3). Population density varied considerably (14.38-62.54 thousands of individuals per 1 m3) and was connected with the dynamics of species and size composition of the dominant patterns of zooplankton.--Copyright 1973, Biological Abstracts, Inc.
W74-01265

THE OXYGEN STATUS OF LAKE SEDIMENTS,
For primary bibliographic entry see Field 02J.
W74-01266

THE BOTTOM MACROFAUNA OF THE OLIGOTROPHIC LAKE KONNEVESI, FINLAND,
Jyvaskyla Univ. (Finland). Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01287

PLANNED DATA STORAGE METHODS FOR THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES,
McMaster Univ., Hamilton (Ontario). Center for Applied Research and Engineering Design.
For primary bibliographic entry see Field 07C.
W74-01296

A NEW SPECIES OF BOECKELLA (COPEPODA: CALANOIDA) FROM NORTHLAND, NEW ZEALAND,
Waikato Univ., Hamilton (New Zealand). School of Science.
For primary bibliographic entry see Field 05A.
W74-01309

PROTOZOA FROM BLUE LAKE, RAOUL ISLAND,
Massey Univ., Palmerston North (New Zealand). Dept. of Microbiology and Genetics.
For primary bibliographic entry see Field 05C.
W74-01310

ZOOPLANKTON IN KOLYMA-INDIGIRKA LAKES (IN RUSSIAN),
G. G. Kirillova, and V. A. Sokolova.
Gidrobiol Zh., Vol 8, No 4, p 82-85. 1972.
Identifiers: Biomass, Lakes, Plankton, Taiga lakes, Tundra lakes, *USSR (Kolyma-Indigirka Lakes), *Zooplankton, *Rotifers, *Copepoda.

The zooplankton population in 14 lakes from the tundra, USSR and taiga zones were analyzed. In the summer 30 species were identified in tundra lakes. According to population, rotifers predominated followed closely by Copepoda. Cladocera were present in smaller quantities. In taiga lakes 101 species were identified. Usually more than 1/2 of the total biomass was comprised of either Cladocera or Copepoda. The biomass was higher in taiga lakes due to different degrees of overgrowing and different temperature conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-01341

SEASONAL VARIATION OF CHEMICAL PARAMETERS IN ALASKAN TUNDRA LAKES,
Skidmore Coll., Saratoga Springs, N. Y. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-01347

MOLECULE-SIZE DISTRIBUTION OF SOLUBLE HUMIC COMPOUNDS FROM DIFFERENT NATURAL WATERS,
H. De. Haan.
Freshwater Bio. Vol 2, No 3, p 235-241. 1972. Illus.
Identifiers: *Humic compounds, *Molecule-size distribution, Natural waters, Separation techniques, Gels, Sephadex gel filtration, Measurement.

The use of Sephadex G-25, Sephadex LH-20 and CPG-10-75 for the separation of soluble humic compounds from freshwater is tested. It is shown by Sephadex G-25 gel filtration that differences in molecule-size distribution of soluble humic compounds in 1 lake at different times and between lakes can be predicted by E250 and E365 (elution ratios) measurements.--Copyright 1973, Biological Abstracts, Inc.
W74-01351

ON THE FORMATION OF SMALL MARGINAL LAKES ON THE JUNEAU ICEFIELD, SOUTH-EASTERN ALASKA, U.S.A.,
Turku Univ. (Finland). Institutum Geographicum.
For primary bibliographic entry see Field 02C.
W74-01379

CHLORINATED HYDROCARBON INSECTICIDES IN SEDIMENTS OF SOUTHERN LAKE MICHIGAN,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W74-01397

PATHWAYS OF TRACE ELEMENTS IN ARCTIC LAKE ECOSYSTEMS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W74-01401

POPULATION DYNAMICS OF POND ZOOPLANKTON, I. DIAPTOMUS PALLIDUS HERRICK,
Kansas Univ., Lawrence. Div. of Biological Sciences.
For primary bibliographic entry see Field 05C.
W74-01502

CHANGES IN SPECIES COMPOSITION OF PHYTOPLANKTON DUE TO ENRICHMENT BY

N, P, AND SI OF WATER FROM A NORTH FLORIDA LAKE,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W74-01503

THE CHEMICAL OXYGEN DEMAND OF WATERS AND BIOLOGICAL MATERIALS FROM PONDS,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
For primary bibliographic entry see Field 05C.
W74-01543

THE PLANKTONIC ASSOCIATION (CLADOCERA AND COPEPODA) OF A DIMICTIC LAKE OF THE LAURENTIDES PARK, QUEBEC, (IN FRENCH),
Laval Univ., Quebec.
J. G. Bernard, and R. Lagueux.
Nat Can (Que). Vol 99, No 4, p 381-409. Illus. 1972. (English summary).
Identifiers: Bosmina-Longirostris, *Canada (Lake Bedard), *Cladocera, *Copepoda, Cyclops-Scutifer, Daphnia-Catawba, Diaptomus-Minutus, *Dimictic lake, Distribution, Holopedium-Gibberum, Lakes, Parks, Plankton.

A qualitative and quantitative analysis of the crustacean association of Lake Bedard, Foret Montmorency, Quebec, Canada, was made from samples collected during summers of 1967 and 1968. The Crustacea found in Lake Bedard include 6 spp. of Copepoda and 12 spp. of Cladocera. The most important taxa are the Cladocera Holopedium gibberum, Daphnia catawba, Bosmina longirostris and the Copepoda Diaptomus minutus and Cyclops scutifer. In its vertical distribution, C. scutifer remains isolated from the rest of the association, and is located at 4 and 6 m where it is vertually alone. The other species cohabit in the epilimnion and upper part of the mesolimnion.--Copyright 1973, Biological Abstracts, Inc.
W74-01558

PREDICTION OF THE VARIATION IN THE CHEMISTRY OF A LAKE RESULTING FROM AN INCREASE IN SOLUBLE DEPOSITS: APPLICATION: THE SODIUM IN LAKE NEUCHATEL,
Neuchatel Univ. (Switzerland). Centrahydrogeologie.
L. Kiraly, and B. Kubler.
Bull Soc Neuchatel Sci Nat. 95. p 165-172, 1972, Illus.
Identifiers: Chemistry, Lakes, Minerals, Pollution, Prediction, *Sodium ions, Soluble deposits, *Switzerland (Lake Neuchatel), *Ions.

The increase in salt consumption has increased the quantity of Na ions carried into lakes. Following some hypotheses on the variations in the quantity of salt carried in, results of application of a simplified calculation method for determining the increase in the average Na+ level to Lake Neuchatel (Switzerland) were given. Results showed that the average concentration of Na+ in the lake will stabilize about 20 yr after stabilization of the annual salt influx. The method used is valid for the increase of any inert water-soluble pollutants in a reservoir (inert in the sense of any elements not entering directly into a biocycle such as Cl-, Na+, SO4-2 or in a precipitation cycle such as Fe+3, Al+3, etc.). However the method does not take factors such as ionic diffusion or thermal convections into account.--Copyright 1973, Biological Abstracts, Inc.
W74-01562

OCCURRENCE AND CUMULATION OF MICROCOMPONENTS IN BOTTOM SEDIMENTS OF DAM RESERVOIRS OF SOUTHERN POLAND,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
For primary bibliographic entry see Field 05B.
W74-01565

HYDROBIOLOGICAL STUDIES ON THE LEDNICKE RYBNIKY PONDS: SPECIES COMPOSITION AND SEASONAL VARIATION IN THE ABUNDANCE OF PLANKTON (IN CZECH),
Brno Univ. (Czechoslovakia). Hydrobiologicka Laborator.
For primary bibliographic entry see Field 05C.
W74-01567

THE VEGETATION OF FINDLEY LAKE BASIN,
Washington Univ., Seattle. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-01587

METALIMNIC LAYER IN LAKE KINNERET, ISRAEL,
Kinneret Limnology Lab., Tiberias (Israel).
For primary bibliographic entry see Field 05C.
W74-01598

FURTHER STUDIES OF FISH PREDATION ON SALMON STOCKED IN MAINE LAKES,
Maine Dept. of Inland Fisheries and Game, Bangor.
K. Warner.
Prog Fish-Cult. Vol 34, No 4, p 217-221. 1972. Illus.
Identifiers: Esox-Niger, *Fish predation, Lakes, Lota-Lota, *Maine, Micropterus-Dolomieui, Micropterus-Salmoides, Perca-Flavescens, Salmo-Salar, Salmo-Trutta, *Salmon stocking, Salvelinus-Namaycush, Stocked.

The role of 13 fish species as predators on newly stocked salmon (Salmo salar) was evaluated for 69 plantings in 36 Maine lakes from 1965-70. Four of the eight warmwater fishes studied preyed on salmon to some degree. Chain pickerel (Esox niger) were the most serious predators on stocked salmon, but pickerel predation was significantly reduced by scatter planting salmon over deep water. Smallmouth bass (Micropterus dolomieui) and largemouth bass (Micropterus salmoides) were also significant predators in some instances. Yellow perch (Perca flavescens) preyed on stocked salmon to a limited extent. Four of the five coldwater species studied preyed on newly stocked salmon. Burbot (Lota lota) appeared to be the most serious potential coldwater predator. Brown trout (Salmo trutta), lake trout (Salvelinus namaycush), and other salmon preyed on newly stocked salmon, but the degree of predation by salmonids is probably not of serious magnitude in most instances.--Copyright 1973, Biological Abstracts, Inc.
W74-01603

DISTRIBUTION AND MORPHOLOGICAL VARIATION OF LAMPSILIS RADIATA (PELECYPODA, UNIONIDAE) IN SOME CENTRAL CANADIAN LAKES: A MULTIVARIATE STATISTICAL APPROACH,
Manitoba Univ., Winnipeg. Dept. of Zoology.
R. H. Green.
J Fish Res Board Can. Vol 29, No 11, p 1565-1570. 1972.
Identifiers: *Anodonta-Grandis, *Canada, Distribution, Lakes, *Lampsilis-Radiata, *Morphological variation, Pelecypoda, Statistical methods, Unionidae.

Discriminant analysis performed on 62 samples containing Anodonta grandis and 52 samples containing L. radiata collected from 19 lakes in central Canada indicated separation in terms of an environmental factor which was interpreted as suitability of water chemistry for construction of shell. A canonical correlation analysis on morphological and environmental variables for 70 specimens of L. radiata yielded 2 highly significant canonical variates which related components of environmental variation to components of morphological variation. One was interpreted as variation in water turbulence, which primarily affected overall size. The other was similar to the factor which separated A. grandis from L. radiata and was interpreted similarly. Shell weight, or thickness, rather than overall size, was affected. Environments were successfully predicted for shells from 2 locations not included in the original analysis.--Copyright 1973, Biological Abstracts, Inc.
W74-01608

A MATHEMATICAL MODEL OF PRIMARY PRODUCTIVITY AND LIMNOLOGICAL PATTERNS IN LAKE MEAD,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 05C.
W74-01630

FRESHWATER MUSSEL ECOLOGY, KENTUCKY LAKE, TENNESSEE, MAY 1, 1969--JUNE 15, 1972,
Tennessee Game and Fish Commission, Nashville.
For primary bibliographic entry see Field 05C.
W74-01641

2I. Water in Plants

NUMBER AND SIZE OF DRIFTING NYMPHS OF EPHEMEROPTERA, CHIRONOMIDAE, AND SIMULIDAE BY DAY AND NIGHT IN THE RIVER STRANDA, WESTERN NORWAY,
Bergen Univ. (Norway). Zoological Museum.
I. Steine.
Nor Entomol Tidsskr. Vol 19, No 2, p 127-131. 1972. Illus.
Identifiers: *Chironomidae, Drifting fauna, *Ephemeroptera, *Norway (River Stranda), *Nymphs, Rivers, *Simuliidae, Size, Western.

Observations on the drift fauna in River Stranda (Voss, western Norway) were carried out in Aug. 1969. Quantitative samples were taken at hourly intervals throughout a 24-hr period at 2 different localities in the River Stranda. The nymphs of Ephemeroptera, Chironomidae, and Simuliidae were most abundant. The body size of drifting nymphs of the Ephemeroptera varied according to the time of day, with small individuals making up the population during day-time and larger animals at night. No such diurnal change was observed in the case of the Chironomidae and Simuliidae.--Copyright 1973, Biological Abstracts, Inc.
W74-01230

THE EFFECT OF SAND DEPOSITION UPON THE MACRO-INVERTEBRATE FAUNA OF THE RIVER CAMEL, CORNWALL,
Cornwall River Authority, Launceston (England).
P. M. Nuttall.
Freshwater Biol. Vol 2, No 3, p 181-186. 1972, Illus.
Identifiers: Baetis-Rhodani, Deposition, *England (River Camel), *Fauna (Invertebrates), Rhitrogena-Semicolorata, Rivers, *Sand deposits, Erosion, Tubificidae.

Erosion from a tributary of the River Camel (England) deposited an estimated 10,000 m3 of sand in the main river over a period of 2 yr. The poor incidence of plants and macro-invertebrates from the river was associated with the unstable shifting nature of the sand deposits, rather than turbidity or abrasion caused by particles in suspension. Sand deposition accounted for the low diversity of

invertebrate species below the tributary, and resulted in the elimination of several species which were frequent upstream. Baetis rhodani, Rhithrogena semicolorata, and Tubificidae were abundant where sand deposition had occurred.--Copyright 1973, Biological Abstracts, Inc.
W74-01244

BIOLOGY OF THE ALABAMA SHAD IN NORTHWEST FLORIDA,
Florida Dept. of Natural Resources, St. Petersburg, Marine Research Lab.
J. G. Mills, Jr.
Fla Dep Nat Resour Mar Res Lab Tech Ser. 68 p 1-24. 1972, Illus.
Identifiers: Alabama, Biology, *Florida (Apalachicola River), Georgia, *Shad (Alabama).

Biology of Alabama shad, Alosa alabamae, in the Apalachicola River, was studied from June 1968-April 1971. Adults enter the river in Feb. and spawn in April. Spawning occurs at 19-22C in moderate currents over bottom of coarse sand and gravel. Fecundity ranges from 61,238-257,655. Gonads of shad entering the river were in ripe condition with stage IV oocytes averaging 1159 micro in diameter. The 1969 collection contained 38.3% repeat spawners while the 1970 collection contained 6.3%. Mean fecundity increased 25.8%, although repeat spawners decreased 32%. Adult males enter the river in larger numbers than females at water temperatures below 72C. Adult shad do not feed during the spawning run. One, two and three yr old shad make the spawning run. Female mean length and weight were 394 mm (TL/total length)) and 737 g while male mean length and weight were 349 mm (TL) and 474 g. Length frequency analysis of juveniles indicate progeny of 3 spawning groups, their origins being the Chipola River, the Cattahoochee-Flint River, and the Jim Woodruff Dam. Most juvenile shad grew 30 mm/mo. Juveniles emigrate from the river at 125 mm (FL/fork length) or in Dec. Sport fishing potential is good since catch frequency is estimated as one shad/rod every 19.72 min.--Copyright 1973, Biological Abstracts, Inc.
W74-01248

SENSITIVITY OF CELL DIVISION AND CELL ELONGATION TO LOW WATER POTENTIALS IN SOYBEAN HYPOCOTYLS,
Illinois Univ., Urbana. Dept. of Botany.
For primary bibliographic entry see Field 03F.
W74-01249

DIE-BACK IN THE MIXED HARDWOOD FORESTS OF EASTERN VICTORIA: A PRELIMINARY REPORT,
Forests Commission of Victoria, Melbourne (Australia).
For primary bibliographic entry see Field 04A.
W74-01251

DIATOMS OF THE UPPER COURSE OF THE STREAM SANKA (CRACOW-CZESTOCHOWA UPLAND), (IN POLISH),
Polish Academy of Sciences, Krakow. Instytut Botaniki.
K. Hojda.
Fragm Florist Geobot (Krokow). Vol 17, No 3, p 445-454. 1971, Illus, (English summary).
Identifiers: *Diatoms, *Poland (Cracow-Czestochowa upland), Seasonal, Streams, Uplands.

The bottom of the stream Sanka in the investigated section (Poland) is partly sandy, covered with calcareous stones or with a layer of slime. It is up to 4 m wide, the depth of water is 50 cm. The material was collected in summer and autumn 1969.--Copyright 1973, Biological Abstracts, Inc.
W74-01258

AUTECOLOGY OF ATRIPLEX POLYCARPA FROM CALIFORNIA,
Aleppo Univ. (Syria). Faculty of Agriculture.
M. N. Sankary, and M. G. Barbour.
Ecology. Vol 53, No 6, p 1155-1162. 1972.
Identifiers: Atripleto-Brometum, *Atriplex-Polycarpa, *Autoecology, California (San Joaquin valley), Ecology, Germination, Growth, Haloxylon-Articulatum, Light, Moisture, Salinity, Salsola-Vermiculata-Var-Villosa, Temperature, Wilting.

Atriplex polycarpa (Torr.) Wats. was a dominant, palatable shrub of the xeric Atripleto-Brometum disclimax in the San Joaquin valley of California. Overgrazing and agriculture during the past 100 yr have restricted its present distribution to saline or fenced areas. Optimal germination temperatures (9-15C) are close to those that prevail in nature in Nov., the month of utricle dispersal. Germination is rapid and can occur over a wide range of temperatures (3-33C); it is reduced by light and NaCl greater than 1%, but indifferent to temperature alternation and soil CaCO3 content. It is unlikely that the bracteoles contain inhibitors. In a field plot in the Temblor Range of California, during a growing season with 115 mm precipitation the seeds sown produced an established seedling, possibly because of competition by introduced annuals. Optimal growth conditions were 18-hr photoperiod, 24 plus or minus 4C. Growth at 12C was quite slow. If conditions are favorable A. polycarpa can produce a large biomass, but it possesses a long juvenile stage of greater than 2 yr prior to flowering. The base value of shoot water potential at no moisture stress is -18 bars, but this can be modified downward by pre-exposure to minor cycles of drought. This species can endure soil moisture below that which causes ultimate wilting of sunflower plants and can recover from a shoot water potential as low as minus 69 bars. Plants in nature, in Aug., exhibited a shoot water potential as low as minus 58 bars. This species is compared in a number of ways to Syrian ecological equivalents Haloxylon articulatum and Salsola vermiculata var. villosa.--Copyright 1973, Biological Abstracts, Inc.
W74-01259

SPRING FLOODING AND FAUNA (IN RUSSIAN),
N. K. Sukhodol'skaya.
Vestn Zool, Vol 6, No 4, p 89, 1972.
Identifiers: Adder, Beaver, Deer, Ermine, Fauna, *Flooding, Fox, Grass, Hare, Marten, Snake, Tortoise, *USSR (Kanevskii National Reserve), Weasel, *Animal migration.

The movement of foxes, deer, martens, ermines, weasels, beaver, hares, tortoises, grass snakes and adders from an island in the Kanevskii National Reserve, USSR, is traced during its submergence in the spring floods of 1970.--Copyright 1973, Biological Abstracts, Inc.
W74-01261

INVERTEBRATE FAUNA OF WATERS OF THE STATION 'AGAPA' (WESTERN TAIMYR), (IN RUSSIAN),
N. M. Shalaeva.
Vestn Mosk Univ Ser 6 Biol Pochvoved, Vol 27, No 4, p 98-100, 1972, English summary.
Identifiers: Acanthocyclops-viridis, Asplanchna-priodonta, Cyclops-strennus, Daphnia-pulex, Eucypris-glacialis, Eurycercus-glacialis, Fauna, Heterocope-borealis, *Invertebrate fauna, Lepidurus-arcticus, Polyartemia-forcipata, Taimyr, *USSR (Agapa River).

A study of the invertebrate fauna in lakes and rivers near the Agapa river in western Taimyr, USSR revealed 2 groups of invertebrates. The first group was those that are extensively distributed in various regions of USSR: Acanthocyclops viridis, Cyclops strennus, Daphnia pulex, and Asplanchna priodonta. The second group was species characteristic for northern waters such as Heterocope borealis, Eurycercus glacialis, Eucypris glacialis, Lepidurus arcticus, and Polyartemia forcipata.--Copyright 1973, Biological Abstracts, Inc.
W74-01264

REVISIONS AND NEW TAXA IN NEW ZEALAND NOTONEMOURIDAE (INSECTA: PLECOPTERA),
I. D. McLellan.
New Zealand Journal of Marine and Freshwater Research, Vol 6, No 4, p 469-481, December 1972. 30 fig, 5 ref.

Descriptors: *Systematics, *Stoneflies, Ecology, Larvae.
Identifiers: Spaniocercoides hudsoni, Spaniocercoides cowleyi, Spaniocercoides fimbria, Omanuperla bruningi, Macroinvertebrates, Cristaperla fimbria.

A revised diagnosis of Spaniocercoides is given, S. hudsoni Kimmins is redescribed, its larva is described for the first time, and notes on variation and ecology are added. Additions and amendments to the description of S. cowleyi (Winterbourn), and notes on its ecology are given. S. fimbria Winterbourn is removed to Cristaperla gen. nov., and the male epiproct, the female and part of the larval exuviae are described for the first time. Omanuperla gen. nov. is erected to contain O. bruningi sp. nov. Notes on the origin and structure of ovipositors and keys to imagines and larvae are given. (Little-Battelle)
W74-01299

REVISION OF FAMILY AND SOME GENERIC DEFINITIONS IN THE PHAENNIDAE AND SCOLECITHRICIDAE (COPEPODA: CALANOIDA),
New Zealand Oceanographic Inst., Wellington. Dept. of Scientific and Industrial Research.
For primary bibliographic entry see Field 05A.
W74-01308

DIATOM FLORA OF THE GRAND RIVER, ONTARIO, CANADA,
Waterloo Univ., (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 05A.
W74-01311

GROWTH RATE AND DEVELOPMENT OF THE ROOT/SHOOT RATIO IN REEDSWANP MACROPHYTES GROWN IN WINTER HYDROPONIC CULTURES,
Ceskoslovenska Akademie Ved, Trebon. Botanicky Ustav.
D. Dykyjova, P. Ondok, and D. Hradecka.
Folia Geobot Phytotaxon. Vol 7, No 3, p 259-268. 1972. Illus.
Identifiers: Bulboschoenus-Maritimus, Growth rate, Humidity, Hydroponic cultures, *Macrophytes, Morphology, Phragmites-Communis, *Reed swamp plants, Schoenoplectus-Lacustris, Season, Species, Swamp, Temperature, Typha-Angustifolia, Winter, *Root/shoot ratio.

Littoral emergent macrophytes develop a complicated system of underground perennial organs, which propagate by tillers, bulbs or rhizomes forming extensive colonies. In natural habitats, it is sometimes not possible to estimate the annual production of these organs. The distribution of the biomass into above ground and underground organs was followed during the initial stage of polycormone development in winter hydroponic cultures. The plants were cultivated from lateral winter buds, rhizome cuttings and seedlings on a solid substrate, flooded with a nutrient solution. Two temperature regimes (15 degrees and 20 degrees) and 3 different dates of autumn and winter planting were chosen. Data on temperature, relative humidity, and density of incident solar

radiation were recorded. The growth rhythm of shoots, leaves and underground organs was followed and the increase of the leaf area, biomass dry weight and the ratio of the underground to the above ground biomass R/S from successive samples were estimated. In all species planted in Nov. the leaf area development, growth, final standing crop and the root/shoot (R/S) ratio were smaller than in the winter plantings, which was caused by an incomplete period of dormancy. The winter plantings showed a larger biomass of plants and leaf area increase, which in Feb. and March, was even more stimulated by the higher densities of irradiation. In all species, the R/S ratio shifted with the growth and the biomass increase in favor of the underground organs. Four phases of growth and the distribution pattern of both the above ground and underground organs during the inititial phase of polycormone development were distinguished. The R/S ratio may be a relatively constant quantitative species characteristic, but only for a given growth phase.--Copyright 1973, Biological Abstracts, Inc.
W74-01346

NEW RECORDS OF SARGASSUM HAWAIIENSIS DOTY AND NEWHOUSE (SARGASSACEAE, PHAEOPHYTA), A DEEP WATER SPECIES,
Hawaii Univ., Honolulu. Dept. of Botany.
R. E. De Wreede, and E. C. Jones.
Phycologia, Vol 12, Nos 1/2, p 59-62, June 1973. 2 fig, 11 ref.

Descriptors: *Phaeophyta, *Deep-water habitats, *Systematics, *Marine algae, Kelps, Speciation, Plant morphology, Plant groupings, *Hawaii.
Identifiers: *Sargassum hawaiiensis.

Sargassum hawaiiensis Doty and Newhouse was described in 1966 from a fragmentation specimen dredged from a depth of 50 m off Oahu, Hawaii. Until recently, no further collections have been available for study. In 1968 and 1971 new material was collected from Penguin Banks off Molokai, Hawaii, during shrimp trawling operations by the National Marine Fisheries Service vessel 'Townsend Cromwell'. The specimens were obtained from depths of 183 and 200 meters. A complete description of the species is given, which differentiates it from the three other species of Sargassum recognized from Hawaii. Sargassum hawaiiensis is distinguished by a combination of characteristics, these being: simple spines on some branches, terete vesicle petioles, muticous and spherical vesicles and bifurcate receptacles with narrow sterile bridges. (Holoman-Battelle)
W74-01349

SUBLITTORAL BENTHIC MARINE ALGAE OF SOUTHERN CAPE COD AND ADJACENT ISLANDS: PSEUDOLITHODERMA PARADOXUM SP. NOV. (RALFSIACEAE, ECTOCARPALES),
Massachusetts Univ., Gloucester. Marine Station.
For primary bibliographic entry see Field 05A.
W74-01350

DETERMINATION OF LOW CONCENTRATIONS OF COBALT IN PLANT MATERIAL BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Western Australia Univ., Nedlands. Inst. of Agriculture.
For primary bibliographic entry see Field 02K.
W74-01356

EFFECT OF THE DESNA RIVER FLOOD ON DEVELOPMENT OF VEGETATION AND FLORA OF THE OSTER OUTSKIRTS (UKRANIAN)
M. I. Kotov.
Ukr Bot Zh., Vol 29, No 4, p 514-517, 1972. (English summary).
Identifiers: Achillea-Borysthenica, Acorellus-Pannonica, Artemisia-Dniproica, Callitriche-Palustris-F-Minima, Chenopodium-Acerifolium, Dichostylis-Mitchelliana, *Floods, *Flora, Galium-Salicifolium, Reproduction, River, Rumex-Ucrainicus, Senecio-Tataricus, *USSR (Desna River), Valeriana-Nitida, *Vegetation, Willow, Xanthium-Californicum.

For 8 yr (at summer time) development of vegetation in an area of 6 x 3 km sq on the left bank of the Desna river within the outskirts of Oster, the Chernigov region (USSR) was observed. The site was on sandy hills, in the flood plain willow forest of white willow and on the riparian alluvial sands. It was established that periods of development in different species vary in different years. The Desna river was particularly large in 1970. Water took the aquatic and riparian plants to high areas where they germinated. Bloom and fruiting under such conditions in Callitriche palustris L. f. minima (L.) Rchb. was recorded. Gigantism was observed in Valeriana nitida Kreyer., Senecio tataricus Less. and other plants growing near the border of a willow forest. Many endemic plants grow in the flood plain of the Desna river, such as: Rumex ucrainicus Fisch., Dichostylis michelliana (R. et Sch.) Nees., Chenopodium acerifolium Andrz., Acorellus pannonicus (Jacq.) Palla, Galium salicifolium Klok., Achillea borysthenica Klok., Artemisia dniproica Klok. Many adventitious plants --Copyright 1973, Biological Abstracts, Inc.
W74-01362

PHYTOPLANKTON OF THE CZECHOSLOVAK SECTOR OF THE DANUBE AND OF THE ESTUARIES OF THE PRINCIPAL TRIBUTARIES ON CZECHOSLOVAK TERRITORY, (IN CZECT.),
Slovenske Narodne Muzeum, Bratislava (Czechoslovakia).
S. Juris.
Zh Slov Nar Muz Prir Vedy. Vol 18, No 1, p 19-27, 1972. Illus.
Identifiers: Asterionella-Formosa, *Czechoslovakia (Danube River), Density, Estuaries, Melosira-Distans-Alpigena, *Phytoplankton, Stephanodiscus-Hantzschii, Temperature, Transparency, Tributaries, Velocity, *Sampling.

Water samples taken from 5 different localities of the Danube contained an average of 5150 cells/ml. Altogether 63 taxa of algae were identified. The dominant phytoplankton species were Stephanodiscus hantzschii, Melosira distans var. alpigena and Asterionella formosa which are autochthonous species of the river. The tributaries have a lower phytoplankton density than the Danube. Phytoplankton multiples in the Danube with blind arms of the river and various ponds in the inundation area are the principle supply sources. The Danube was found to have a lower transparency of water, lower flow velocity and higher water temperature. The Danube and tributaries contained 86 different taxa.--Copyright (c) 1973, Biological Abstracts, Inc.
W74-01371

PROFILE OF THE VEGETATION OF THE ELBURS MOUNTAIN RANGE (NORTHERN IRAN), (IN GERMAN),
Paedogogische Hochschule, Loerrach (West Germany).
W. Probst.
Bot Jahrb Syst Pflanzengesch Pflanzengeogr. Vol 91, No 4, p 496-520. 1972, Illus, (English summary).
Identifiers: *Aridity, Beech, Carpinus, Cypress, Elburs, *Iran (Elburs Mt. Range), Juniperus-Macropoda, Moss, Mountain ranges, Parrotia-Persica, Quercus-Macranthera, Thuja-Orientalis, *Vegetation, Winds, *Forest zones.

Four vegetation transects through the Elburs mountain range are described: Transect A (Rasht, Sefidrud) is determined by the piercing of the Sefidrud River through the main chain of the Elburs. In this valley, cypress groups border on elements of a half-moist deciduous forest as well as on the dry Juniperus forest of the south. In the valley of the Rud-e-Molla Ali, moss pads on the rocks as far as 40 km south of the main chain indicate the influence of the moist Caspian winds. Transect B (Chalus-Karadj) and C (Babolsar-Semnan) represent the vegetational distribution of the Central Elburs: the low mesozoic northern bordering chain which catches the first orographic rains is composed of a dense moist forest, the Hyrcanian Lowland Forest, with its characteristic tree Parrotia persica. In the valley of the Chalus River, a dry basin landscape with cypress trees meets immediately the Lowland Forest Zone. In the Talar valley, this dry intermediate region lies 400 m higher, between the upper and lower borders of the mountain forest. Whereas beech dominates the Caspian Mountain Forest up to 1600 m, oaks and Carpinus prevail in higher levels. The upper forest limit, at present about 2000-2600 m, is an aridity border. Subalpine coniferous forests as well as alpine dwarf bush formation are lacking: Quercus macranthera bush is bordering immediately on thorncushion and tall-herb vegetation. In lower altitudes of the southside there are remnants of the formerly widespread J. macropoda dry forest. Transect D (Shahpasand-Khordabad) is not far from the eastern arid border of the Hyrcanian Forest area. Judas trees, adapted to the dryer climate, thrive beside oaks. In a dry intermediate zone Thuja orientalis takes the place of the cypresses of the Chalus and Sefidrud valleys. Two factors are especially important for the horizontal arrangement of the vegetation: the minimum temperature of the winter and the water supply.--Copyright 1973, Biological Abstracts, Inc.
W74-01385

BRYOCENOLOGICAL RESEARCH IN SOME AREAS OF THE IRON GATE OF THE DANUBE, (IN RUMANIAN),
T. I. Stefureac, and G. Mihai.
Stud Cercet Biol Ser Bot. Vol 24, No 2, p 117-122, 1972.
Identifiers: *Bryocenological studies, Eurhynchium-Swartzii, Fissidens-Taxifolius, Forests, Grimmia-Pulvinata, Humidity, Madotheca-Platyphylla, Neckera-Crispa, Orthotrichum-Saxatile, Pellia-Fabbroniana, *Romania (Danube River), *Vegetation.

The structure and the vegetation of bryophytes in some sectors (Cazanele Mari, Svinita-Tricule, etc.) of the Iron Gates of the Danube in southwestern Romania are analyzed. Four associations are described with mention of characteristic and accompanying species: Ass. Schistidietum apocarpae Stefu. 1940, Ass. Hedwigietum medioeuropaeum (Allorge 1922) v. Huebsch. 1955, Ass. Grimmia pulvinata-Orthotrichum saxatile Stodiek 1937 and Ass. Oxyrrhynchietum rusciforms Gams 1927, as well as certain aspects of the moss vegetation with Eurhynchium swartzii-Fissidens taxifolius; Pellia fabbroniana Neckera crispa and Madotheca platyphylla. A series of 6 phytocenologic tables are presented, indicating their saxicolous xerophile-photophile or hygro-hydrophile character and the classification of some of these in the forest vegetation.--Copyright 1973, Biological Abstracts, Inc.
W74-01453

ELEMENT CONSTITUTION OF SELECTED AQUATIC VASCULAR PLANTS FROM PENNSYLVANIA: SUBMERSED AND FLOATING LEAVED SPECIES AND ROOTED EMERGENT SPECIES,
Pennsylvania State Univ., University Park. Dept. of Biology.
For primary bibliographic entry see Field 05A.
W74-01526

THE AMOUNT OF SPACE AVAILABLE FOR MARINE AND FRESHWATER FISHES,
California State Univ., Fullerton. Dept. of Biology.
M. H. Horn.
U S Natl Mar Fish Serv Fish Bull, Vol 70, No 4, p 1295-1297, 1972.
Identifiers: *Fishes, Freshwater fish, *Marine fish.

Marine fishes have 10-10,000 times more space available per individual than freshwater forms. On the basis of total numbers per species, the difference per unit volume between the oceans and freshwater is only 10-fold whereas on the basis of species per unit volume, the difference is approximately 7500-fold.--Copyright 1973, Biological Abstracts, Inc.
W74-01561

PERSISTENCE OF HEADWATER CHECK DAMS IN A TROUT STREAM,
California Univ., Berkeley. School of Forestry and Conservation.
R. Gard.
J Wildl Manage, Vol 36, No 4, p 1363-1367, 1972.
Identifiers: *California (Sagehen Creek), Dams, Salvelinus-fontinalis, Streams, *Brook trout.

The condition of a series of small dams constructed in 1957 in the headwaters of Sagehen Creek, California, was determined in 1969. Changes in a population of brook trout (Salvelinus fontinalis) introduced into the new ponds were also assessed. After a 12-yr period, about half of the dams were in good to excellent condition. Average depth of the ponds decreased from 16 to 10 in, but holes 9-13 in deep were created below the dams. The standing crop of trout of catchable sizes (> or equal to 100 mm in length) was estimated to be 93 trout weighing 9.6 lbs (equivalent to 394 trout/acre weighing 41 lbs). This is comparable to the standing crop in 6 miles of stream below the headwaters of Sagehen Creek. The cost of constructing the dams and introducing the trout was $154, or $12.80/yr over the 12-yr period.--Copyright 1973, Biological Abstracts, Inc.
W74-01566

A NEW TYPE OF CLIMATIZED GAS EXCHANGE CHAMBER FOR NET PHOTOSYNTHESIS AND TRANSPIRATION MEASUREMENTS IN THE FIELD,
Wuerzburgh Univ. (West Germany). Boranisches Institut II.
E. D. Schulze.
Oecologia (Berl), Vol 10, No 3, p 243-251, 1972, Illus.
Identifiers: *Carbon dioxide, Climatized control, *Gas exchange chamber, Measurements, Mesophyll, *Photosynthesis, Temperature, *Transpiration.

A temperature- and humidity-controlled plant chamber for CO2 and water exchange measurements in the field is described in which the heat exchanger assembly and humidity controlling water vapor trap are separated from the plant cuvette. The shape and construction material of the plant cuvette can vary according to the demands of the experimental conditions and the size and growth form of the plant. The natural illumination field is only slightly altered in this plant cuvette. In the chamber, the temperature and humidity conditions can either be held constant throughout a wide range of conditions or can be programmed to track ambient conditions. In this manner, not only temperature and absolute humidity are replicated, but it is also possible to reproduce the natural conditions of water vapor gradient between the evaporating surfaces in the mesophyll and the atmosphere, the relative humidity of the air, and the temperature difference between the leaf and the ambient air. Thus, the chamber appears to be an appropriate instrument to investigate with sufficient accuracy the reactions of individual plants in cultivation or in natural communities under field conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-01568

EXPERIMENTAL ESTABLISHMENT OF FOREST PLANTATIONS ON SANDS, IN ACCORDANCE WITH THE IDEA OF G. N. VYSOTSKII (IN RUSSIAN),
I. M. Krivokobyl'skii.
Lesovod Agrolesomelior Resp Mezhved Temat Nauchn Sb. 20. p 91-95, 1970.
Identifiers: Acer-negundo, Apricot, Black locust, Caragana-arborescens, *Fertilizers, *Forests, Honey locust, Mahaleb cherry, Peat, Plantations, *Sands, *USSR (Lower Dnieper Sands).

Analysis is made of the 1937 trial planting of tree and shrub species inside the Aleshkovskaya Arena (plot) in the Saga area (Lower Dnieper Sands) on highly elevated deep monophase sands with ground waters at a depth of 3 m. Plantings were made according to the idea of G. N. Vysotskii, the essence of which consisted of the introduction under the forest plantation of a water-absorbing nutritive interlayer of pure peat (P), of P with mineral fertilizers (F) (ammonium nitrate and superphosphate with 90 kg/ha each of active component) (P + F), of pure loess-like loam (LLL), LLL with mineral fertilizers (LLL + F), and of mineral fertilizers only. P and LLL were placed in ditches 1 m wide, with a distance between the ditches of 8 m, in interlayers 10 cm thick to a depth of 30-40 and 40-50 cm, whereas mineral fertilizers were placed at a depth of 20-30 cm. At the end of the first year after planting, good height growth, in comparison with the control was observed in the interlayer of pure P in Caragana arborescens (50-fold increase of increment). Also mahaleb cherry and honey locust responded well (36-48-fold increase of increment). Some species in the variant P + F grew even better, in honey locust the increment increased 100-fold, in black locust-29-fold, in apricot and in Acer negundo--20-fold and 23-fold, respectively. A good increment was also observed in the variant LLL + F (the increment of honey locust increased 111-fold). In all the broad-leaved tree species the growth began to slow and afterward stopped altogether.--Copyright 1973, Biological Abstracts, Inc.
W74-01569

THE CARBOHYDRATE AND WATER BALANCE OF BEANS (VICIA FABA) ATTACKED BY BROOMRAPE (OROBANCHE CRENATA),
Royal Univ. of Malta, Valletta. Dept. of Biology.
For primary bibliographic entry see Field 03F.
W74-01575

DESERT DOGMA REEXAMINED: ROOT/SHOOT PRODUCTIVITY AND PLANT SPACING,
California Univ., Davis. Dept. of Botany.
M. G. Barbour.
Am Midland Nat. Vol 89, No 1, p 41-57. 1972.
Identifiers: Allelopathy, Desert vegetation, Moisture, *Plant spacing, *Root/shoot productivity.

The factual basis for 3 generally accepted concepts about desert vegetation is reviewed, and found wanting. The concepts must, at least , be strictly qualified. The concepts are: net primary productivity is low; desert perennial plants possess a fast-growing root system which produces a high root/shoot ratio, and perennials tend to be distributed in a regular pattern, due to competition for moisture or allelopathic interactions. Areas for further research and documentation are indicated.--Copyright 1973, Biological Abstracts, Inc.
W74-01585

FACTORS AFFECTING THE DISTRIBUTION OF SOME PHRYGANEAEID (TRICHOPTERA) IN MALHAM TARN, YORKSHIRE,
Nature Conservancy, Aberystwyth (Wales).
R. P. Bary.
Freshwater Biol. Vol 1, No 2, p 149-158. 1971, Illus.
Identifiers: *Agrypnetes-Crassicornis, Chara, Dispersal, Distribution, Habitat, *Phryganea-Obsoleta, Phryganeaeid, Potamogeton, *Trichoptera, *United Kingdom (Malham Tarn-Yorkshire).

A distribution problem involving Agrypnetes crassicornis and Phryganea obsoleta (Trich-optera:Phryganeidae) in Malham Tarn, Yorkshire (United Kingdom) is described. The only suitable habitat for their larvae is offshore vegetation, chiefly Chara delicatula, but owing to the specialized egglaying behavior of this family and the absence of other sites, the eggs of A. crassicornis are laid on the exposed rocky shoreline. The situation with P. obsoleta differs in that the emergence of Potamogeton spp. provides new oviposition sites away from the shore. Investigations on both species, however, have provided further support for an hypothesis which postulates the importance of wind-induced water movements in rapidly dispersing newly hatched insect larvae to the favorable habitats in deep water.--Copyright 1973, Biological Abstracts, Inc.
W74-01586

SEASONAL WATER POTENTIAL PATTERNS IN THE MOUNTAIN BRUSH ZONE, UTAH,
Saint Louis, Univ., Mo. Dept. of Biology.
S. J. Dina, L. G. Klikoff, and M. B. Keddington.
Am Midland Nat. Vol 89, No 1, p 234-239. 1973.
Identifiers: Acer-Spp., Artemisia-Tridentata, Berberis-Repens, Betula-Occidentalis, Cercocarpus-Ledifolius, Elevation, Paxistima-Myrsinites, Purshia-Tridentata, Quercus-Gambelii, Regression analysis, Seasonal, Seasons, Temperature, *Utah, *Mesic habitat, *Mountain brush zone.

Species in a mesic habitat (Acer negundo, A. grandidentatum, Berberis repens, Betula occidentalis) have higher seasonal water potentials than those in a xeric habitat (Artemisia tridentata, Purshia tridentata, Quercus gambelli), but interspecific water potential patterns vary considerably within as well as between habitats. Of 5 spp. studied along an altitudinal gradient, water potential of Q.gambelii, A. gradidentatum and Pachistima (Paxistima) myrsinites increased with elevation, while B. repens and Cercocarpus ledifolius did not. All species except C. ledifolius exhibited some seasonal decrease in water potential. Seasonal water potential patterns of evergreen species did not differ from those of deciduous species. Linerar multiple regression analyses of several environmental variables indicated that temperature is most often significantly correlated with variation in water potential. Only in C. ledifolius was some temperature measurement not significant.--Copyright 1973, Biological Abstracts, Inc.
W74-01588

UNUSUAL OCCURRENCE OF THE BROOK STICKLEBACK (CULAEA INCONSTANS) IN THE MACKENZIE RIVER, NORTHWEST TERRITORIES,
Department of the Environment, Winnipeg (Manitoba). Fisheries Service.
M. R. Falk.
J Fish Res Board Can. Vol 29, No 11, p 1655-1656. 1972.
Identifiers: *Brook stickleback, *Canada (Mackenzie River-N.W.T.), Culaea-Inconstans, Rivers.

Two specimens of the brook stickleback (C.inconstans) were taken in the mouths of Pierre and Tsital Trien creeks near Arctic Red River on the Mackenzie River, Canada, during 1971. Previous

most northerly published records were from the south shore of Great Slave Lake. The specimens may have been carried downstream by spring floods and may not represent a resident population.--Copyright 1973, Biological Abstracts, Inc.
W74-01589

CARBON DIOXIDE EXCHANGE BY SEVERAL STREAM-SIDE AND SCRUB OAK COMMUNITY SPECIES OF RED BUTTE CANYON, UTAH,
Saint Louis Univ., Mo. Dept. of Biology.
S. J. Dina, and L. G. Klikoff.
Am Midland Nat. Vol 89, No 1, p 70-89. 1973, Illus.
Identifiers: Acer-Grandidentatum, Acer-Negundo, Artemisia-Tridentata, Berberis-Repens, Canyons, *Carbon dioxide, Community, Exchange, Moisture, *Oak, Purshia-Tridentata, Quercus-Gambelii, Scrub oak, Species, *Utah (Red Butte Canyon).

Species of a xeric scrub oak community (scrub oak, Quercus gambelii; sagebrush, Artemisia tridentata; bitterbrush, Purshia tridentata) have lower seasonal water potentials than species of a mesic streamside habitat (BOX ELDER, Acer negundo; bigtooth maple, A. grandidentatum; creeping barberry, Berberis repens). The restriction of box elder to mesic sites is, in part, a function of its physiolocical responses to moisture stress. Positive net photosynthesis of box elder ceases at water potentials 10 to 15 bars higher than net photosynthesis of the other species, and dark respiratory rates of box elder decline more rapidly. The relative photosynthetic and dark respiratory responses to water stress of scrub oak, sagebrush, Bitterbrush, bigtooth maple and creeping barberry are apparently not significant factors influencing the distribution of these species.--Copyright 1973, Biological Abstracts, Inc.
W74-01590

GERMINATION RESPONSES OF A TEXAS POPULATION OF OCOTILLO (FOUQUIERIA SPLENDENS ENGELM.) TO CONSTANT TEMPERATURE, WATER STRESS, PH AND SALINITY,
Texas Univ., El Paso. Dept. of Biological Sciences.
C. E. Freeman.
Am Midland Nat. Vol 89, No 1, p 252-256. 1973, Illus.
Identifiers: Fouquieria-Splendens, *Germination, *Ocotillo, Population, Salinity, Temperature, *Texas, Water stress, Hydrogen ion concentration.

Ocotillo had no dormany requirements, and germinated equally well in light or darkness. Optimum constant temperature was 20-25 degree C, the limits being approximately 10 degrees and 40 degrees C. Ocotillo seeds germinated well to a water stress of -5.0 atm, but germination declined rapidly to -10.0 atm. Germination was best at pH 7.5, declined at 8.0, and was quite low at pH's 8.5 and 9.0 over the range tested. Ocotillo germinated well under saline conditions, the decline in germination with increasing salinity being attributable to the effects of water stress to 7080 ppm NaCl.--Copyright 1973, Biological Abstracts, Inc.
W74-01591

LONGITUDINAL DISTRIBUTION AND HABITAT OF THE FISHES OF MASON CREEK, AN UPPER ROANOKE RIVER DRAINAGE TRIBUTARY, VIRGINIA,
Roanoke Coll., Salem, Va. Dept. of Biology.
R. E. Jenkins, and C. A. Freeman.
Va J Sci. Vol 23, No 4, p 194-202. 1972, Illus.
Identifiers: Drainage, *Fish habitats, *Longitudinal distribution, Rivers, *Virginia (Roanoke River tributary).

Mason Creek is an Order 4 tributary of 15.0 miles in length within the upper Roanoke drainage, Virginia. Based on a total of 16 collections from 7 localities and on personal communications, its present ichthyofauna includes 40 spp. distributed among 7 families. The fauna is typical of that of the upper Roanoke drainage. Faunal diversity (number of species) increased regularly from the headwaters to the mouth, from 6 species at the uppermost station to 31 at the lowermost. The dominant trend was addition of species, rather than replacement, in the downstream direction. Most species showed a pattern of longitudinal zonation, disappearing in the upstream direction after apparently being continuously distributed, or they appeared only in the headwaters. Few species were collected at all stations. Thirty-two species were recorded in pools and 12 in riffles. Generally, only the larger individuals of typically pool-inhabiting forms were found in swifter waters, and the young of species whose adults are riffle fishes frequented quieter waters.--Copyright 1973, Biological Abstracts, Inc.
W74-01592

POPULATION BIOMASS, NUMBER OF INDIVIDUALS, AVERAGE INDIVIDUAL WEIGHT, AND THE LINEAR SURPLUS PRODUCTION MODEL,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Lab.
A. L. Jensen.
J Fish Res Board Can. Vol 29, No 11, p 1651-1655. 1972, Illus.
Identifiers: *Biomass, *Linear surplus-production, *Model studies, Population, Weight, *Bluegill.

The identity Bt±NtWt, where Bt is the population biomass, Nt is the population size and Wt is the average individual weight for all ages, is applied to develop simultaneous equations for change in biomass, number of individuals, and average individual weight for the linear surplus-production equation. It is shown that equations for all 3 variables cannot be simultaneously logistic. The relation between logeNt and logeWt predicted by the linear surplus-production model is compared with observation of bluegill population densities and average weights estimated from 10 yr of cove roteonone sampling in 5 large TVA reservoirs. The fit of the model to the data is fairly good, but it accounts for only a small amount of the total variation observed.--Copyright 1973, Biological Abstracts, Inc.
W74-01593

ASSESSMENT OF TWO MESH SIZES FOR INTERPRETING LIFE CYCLES, STANDING CROP, AND PERCENTAGE COMPOSITION OF STREAM INSECTS,
Alberta Dept. of Lands and Forests, Edmonton. Fisheries Section.
A. Zelt, and H. F. Clifford.
Freshwater Biol. Vol 2, No 3, p 259-269. 1972. Illus.
Identifiers: Assessment, *Ephemeroptera, Life cyclers, *Mesh sizes, *Plecoptera, Sampling, Streams, *Aquatic insects, Standing crops.

Using Surber-type samplers and dip-net samplers, the efficiency of nets having pore sizes of 720 micrometer and 320 micrometer for determining standing crop and percentage composition of the stream fauna, and for collecting representative size-class specimens of Ephemeroptera and Plecoptera to be used in life-cycle studies was assessed. Except for one species, samples collected with either the 720-micrometer or 320-micrometer dip-net led to the same general inferences about the species' life cycle. Of 50 possible sample comparisons, there were 12 samples where the size-class frequencies of particular species collected in the 720-micrometer dip-net were significantly different from the size-class frequencies of the 320-micrometer dip-net; for 5 of these samples a deficit of large nymphs (> 5.0 mn) in the 320-micrometer net mainly contributed to the significant x2 values. On one date, double-bag samplers with both the 720-micrometer and 320-micrometer nets attached to either the Surber or dip-net sampler were used. Approximately 50% of the insects by numbers passed through the 720-micrometer mesh of each sampler, but only 5% by volume-biomass. Shape of the insect as well as body length was important in assessing mesh-size efficiencies. The 720-micrometer mesh of the double-bag dip-net sampler retained most of the Nemoura cinctipes (having stout appendages) and Epeorus longimanus (flattened) nymphs 2.0 mn in body length and larger; whereas most Baetis (streamlined) nymphs smaller than 3.0 mm and all Paraleuctra (needle-like shape) nymphs passed through the 720-micrometer mesh.--Copyright 1973, Biological Abstracts, Inc.
W74-01601

THE RELATIONSHIP BETWEEN MAPLE CANKER INCIDENCE AND PRECIPITATION,
Ohio Agricultural Research and Development Center, Wooster. Lab. of Environmental Studies.
T. C. Weidensaul, and F. A. Wood.
Plant Dis Rep. Vol 56, No 11, p 942-943. 1972.
Identifiers: Acer-Saccharum, Canker, *Fusarium-Spp, *Maple canker, Precipitation, *Pennsylvania.

The study was designed to determine whether, within the natural range of sugar maple (Acer saccharum) in Pennsylvania, levels of precipitation were correlated with canker (caused by Fusarium spp.) frequency. The difference in average yearly precipitation in Pike (106 cm) and Bedford (91 cm) counties was significant at the 0.01 level. An analysis of variance indicated a significant difference in canker frequency between the 2 counties based on a total of 2494 cankers observed. More cankers were observed in Pike County. There was variation in the number of cankers/tree within each county. A correlation analysis was made between the 2 counties with respect to precipitation vs. canker frequency. Although there were significant differences in precipitation and canker frequency, a coefficient of determination (r2) of less than 1% indicated that canker numbers and countywide precipitation were not associated when data from both counties were combined. The coefficients of determination in the 2 counties considered independently were both less than 1%, which also indicates that precipitation alone was not associated with canker frequency. Precipitation alone apparently does not have a significant influence on the frequency of cankers. When coupled with a satisfactory wounding agent and other unfavorable environmental conditions, however, precipitation may have an effect.--Copyright 1973, Biological Abstracts, Inc.
W74-01602

SELECTED SPECIES OF ALGAE FOUND IN CARP PONDS OF THE LASKOWA COMPLEX NEAR ZATOR,
Instytut Zootechniki, Oswiecim (Poland). Zaklad Doswiadczalnej Zator.
T. Bednarz, and M. Nowak.
Acta Hydrobiol. Vol 14, No 1, p 103-112. 1972. Illus. (English summary).
Identifiers: *Algae, Bachycladon-Sp, *Carp ponds, Chlorangiopsis-Piriformis, Franceia-Elongata, Goniochloris-Fallax, Lambertia-Issajevii-Var-Spinosa, Lauterborniella-Appendiculata, *Poland (Upper Vistula River), Ponds, Tetraedon-Cruciatum, Tetraedon-Proteiformae-Var-Granulatu, Tetraedon-Pussillum.

Notes are given on infrequent species of algae found during investigations on the plankton of carp ponds situated in the basin of the upper Vistula (Poland). Among the 30 listed, Goniochloris fallax (Heterokontae), Chlorangiopsis piriformis, Pachycladon sp., Lambertia issajevii var. spinosa,

Franceia elongata, Lauterborniella appendiculata, Tetraedron cruciatum, T. pussillum and T. proteiformae var. granulatum (Chlorococcales) are new for Poland.--Copyright 1973, Biological Abstracts, Inc.
W74-01607

SOME INFLUENCES OF AQUATIC VEGETATION ON THE SPECIES AND NUMBER OF CULICIDAE (DIPTERA) IN SMALL POOLS OF WATER,
Auburn Univ., Ala. Dept. of Zoology-Entomology.
B. M. Furlow, and K. L. Hays.
Mosq News. Vol 32, No 4, p 595-599. 1972.
Identifiers: Aquatic plants, *Culicidae, *Diptera, *Spirodela-Oligorrhiza, *Mosquito population.

Physical configuration of the aquatic vegetation in 10 ft diameter plastic pools in the southeastern United States appeared to influence qualitative parameters of mosquito populations. There were definite trends reflecting the association of particular Culicidae spp. with a particular type of aquatic plant: submerged, floating, emergent or none. Even though apparent quantitative differences were observed in culicid populations among the various types of vegetation, vegetation had no significant effect on population sizes. The floating plant, Spirodela oligorrhize (duck weed), had a detrimental effect on mosquito survival when it completely covered the surface of the water.--Copyright 1973, Biological Abstracts, Inc.
W74-01609

WATER USE BY PERENNIAL EVERGREEN PLANT COMMUNITIES IN AUSTRALIA AND PAPUA NEW GUINEA,
Queensland Univ., Brisbane (Australia). Dept. of Botany.
For primary bibliographic entry see Field 02D.
W74-01634

DISTRIBUTION PATTERNS AND POPULATION DYANMICS OF THE MICRO--ARTHROPODS OF A DESERT SOIL IN SOUTHERN CALIFORNIA,
Westfield Coll., London (England). Dept of Zoology.
J. A. Wallwork.
Journal of Animal Ecology, Vol 41, No 2, p 291-310, June 1972. 11 fig, 10 tab, 15 ref.

Descriptors: *Thermophilic animals, *Deserts, Arid lands, Population, Ecology, Soil environment, Microenvironment, *Distribution patterns, On-site investigations, Mites, Litter, Density, *California, *Sierozems.
Identifiers: Joshua Tree National Monument, Mojave Desert, *Arthropods.

Very little information is availabe about the ecology of desert micro-arthropids, or about the way in which the various species populations are integrated into a community system. This study was designed not only to identify the principal faunal components of a desert soil community, but also to investigate distribution patterns and population dynamics in relation to certain well-defined factors, such as temperature, moisture, shade and food supply. An account is given of the distribution patterns and population dynamics of the micro- arthropod fauna of juniper litter and underlying mineral soil in the Joshua Tree National Monument, Mojave Desert, California, based on samples taken regularly over a 90month period from October 1966 to June 1967. The bulk of the fauna consisted of mites mainly belonging to the Orders Cryptostigmata, Astigmata and Prostigmata. The influence of shade on microdistribution patterns was examined but no significant effect could be detected. Peak densities for the entire fauna occurred in December and in April. The center of mite population densities shifts upwards from the mineral soil to litter as a new generation of individuals is produced. The relationship between this upward extension of the population range and the density peaks occurring in the litter is discussed. (Black-Arizona)
W74-01635

2J. Erosion and Sedimentation

MATHEMATICAL MODELING OF NUTRIENT - TRANSPORT,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 05B.
W74-01121

STRATIGRAPHY AND ECONOMIC GEOLOGY OF THE COASTAL PLAIN OF THE CENTRAL SAVANNAH RIVER AREA, GEORGIA,
Georgia Univ., Athens. Dept. of Geology.
J. Sandy, R. E. Carver, and T. J. Crawford.
Available from the National Technical Information Service as PB-225 151/0, $4.00 in paper copy, $1.45 in microfiche. Geological Society of America, Inc., Southeastern Section Guidebook for Field Trip No 3, April 16, 1966, 11 fig, 1 tab, 15 ref. OWRR A-006-GA (5).

Descriptors: *Stratigraphy, *Geology, *Economics, *Georgia, River basins, Geologic formations, Geologic time, Sedimentation, Sedimentology, Soil profiles, Exploration, Clay minerals, Sands, Gravels, Limestones, Marl, *Coastal plains.
Identifiers: *Savannah River (Geo).

The general stratigraphy and geologic setting of associated commercial clay deposits are illustrated for the coastal plain of the Central Savannah River area in central-east Georgia. Sites are distributed to show the stratigraphic position and mode of occurrence of kaolin, flint kaolin, fuller's earth, and speculities, as well as fossiliferous units of the Jackson Group of Eocene Age. The oldest formation is the Tuscaloosa Formation, of early Upper Cretaceous age. It rests directly on the seawater-dipping, eroded surface of the igneous and metamorphic rocks of the Piedmont Province. The best exposures of both the Barnwell and Tuscaloosa Formations are in the deeper road cuts and open pit mines. Lenses of kaolin of commercial grade and size are found throughout the Tuscaloosa Formation, but appear to be larger and more numerous along a line from central Richmond County to the point where McDuffie, Glascock, Warren, and Jefferson Counties join; extensive deposits of kaolin have been discovered in this area recently, and are being actively explored. (Woodard-USGS)
W74-01122

COHESIONLESS, FINE GRADED, FLAKED SEDIMENT TRANSPORT BY WATER,
Imperial Coll. of Science and Technology, London (England). Dept. of Civil Engineering.
P. A. Mantz.
Nature Physical Science, Vol 246, No 149, p 14-16, November 5, 1973. 3 fig, 1 tab, 13 ref.

Descriptors: *Sediment transport, *Particle shape, Scour, Erosion, Suspension, Suspended load, Sedimentation.

Transport of sediments composed of fine graded flakes was studied using six fine, well-sorted grades of muscovite and biotite mica flakes (specific gravity 2.74). The cohesionless nature of the flakes was established by measuring the angle of repose of part of a bed, after it had been laid down in a laboratory flume. This angle was fairly constant for all but the finest graded material. Each sediment bed composed of mica flakes was exposed to a very slowly increasing magnitude of applied fluid stress. A single mode of transport was observed throughout, giving a bed form known as parting lineations (that is, long ridges, parallel to the flow direction, of grouped particles). During this transport, no suspended load was present. At a critical bed stress for each grade, the lineations began to oscillate in three dimensions. A difference in behavior was found between flakes and grains of the same fall diameter (this diameter is that of a sphere which has a specific gravity of 2.65, and the same fall velocity in still water as the particle). They have differing friction velocities for incipient motion. This gives one quantitative explanation for the geological concept of sediment bypassing (the selective transport of particles). The ratio of incipient suspension friction velocity to incipient motion friction veloicty is fairly constant at about 2.2. This contradicts the general supposition that fine graded sediment becomes suspended at a stress magnitude close to that of incipient motion. (Knapp-USGS)
W74-01125

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF SALTATING SEDIMENTS ON KINEMATICS OF FLOW (EKSPERIMENTAL'-NOYE ISSLEDOVANIYE VLIYANIYA SAL'-TIRUYUSHCHIKH NANOSOV NA KINE-MATIKU POTOKA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
S. K. Olevinskaya, A. A. Pivovarov, and K. I. Rossinskiy.
Vodnyye Resursy, No 2, p 111-117, 1973. 7 fig, 9 ref.

Descriptors: *Sediment transport, *Saltation, *Flow, Turbulence, Turbulent flow, Movement, Sediment discharge, Flumes, Roughness (Hydraulic), Froude number.
Identifiers: USSR, *Kinematics (Sediment transport).

Effects of movement of saltating particles on kinematics of turbulent flow on a hydraulically rough bed were investigated in flume experiments at the Hydrophysics Laboratory of the Department of Physics, Moscow State University. Gravels with particles ranging from 3 mm to 7 mm in diameter and with settling velocities between 26 and 30 cm/sec were used to investigate sediment movement. Interaction of sediment concentration and movement, and effect of sediment concentration on depth distribution of average flow velocities and pulsation intensity are examined, and relations of pulsation intensity to Froude number, sediment concentration in flow, and dynamic roughness are graphed. (Josefson-USGS)
W74-01134

ENGINEERING CHARACTERISTICS OF OVERBURDEN IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01143

OVERBURDEN RELATED TO TYPE OF BEDROCK AND ENGINEERING CHARACTERISTICS OF THE BEDROCK, KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01144

SOIL ASSOCIATION MAP OF KNOX COUNTY, TENNESSEE.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01146

SEDIMENTATION IN A MEANDERING ESTUARY,
Lehigh Univ., Bethlehem, Pa. Marine Science Center.
For primary bibliographic entry see Field 02L.
W74-01177

BEACH CHANGES ON THE OUTER BANKS OF NORTH CAROLINA,
Virginia Univ., Charlottesville.
For primary bibliographic entry see Field 02E.
W74-01179

BEACH CUSPS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
R. J. Russell, and W. G. McIntire.
Geological Society of America Bulletin, Vol 76, p 307-320, March 1965. 5 fig, 7 plates, 6 ref, 2 append.

Descriptors: *Beaches, Berms, *Sedimentation, *Coasts, *Waves (Water).
Identifiers: *Beach cusps, Sea states, Swash zone.

Beach cusps develop along seaward faces of growing berms. They appear early in the transitional period of decreasing wave energy from winter- to summer-beach conditions. Growth stages are described and related to currents within the swash zone. Cusp spacing depends on coastal exposure and state of the sea. Conditions under which cusps disappear are described. Although most steps in the depositional development and erosional removal of cusps are understood, the theory of their origin will remain incomplete until the reasons for their spacing are known in quatitative terms. (Sinha-OEIS)
W74-01180

EFFECTS OF REEFS AND BOTTOM SLOPES ON WIND SET-UP IN SHALLOW WATER,
California Univ., Berkeley. Inst. of Engineering Research.
E. G. Tickner.
Corps of Engineers, Beach Erosion Board, Technical Memorandum No. 122, November 1960. 20 p, 12 fig, 1 tab, 5 ref.

Descriptors: *Coasts, *Reefs, *Slopes, Shallow water, *Wind tides, Waves (Water).

Wind tides in shallow water were studied in a laboratory channel with a reef, with various widths of openings, located near the center of the channel and with various slopes of the channel bottom other than horizontal. The reef increased the set-up over a smooth bottom condition by a factor of two for a solid reef and somewhat less than this if the reef had an opening in it. The cross-sectional integration procedure adequately describes the surface profile for the sloping bottom, while the estimated set-up assuming a constant depth equal to the deepest part underestimates the actual set-up by as much as 2.75. (Sinha-OEIS)
W74-01182

A PROFILE OF THE FOUR MOMENT MEASURES PERPENDICULAR TO A SHORE LINE, SOUTH HAVEN, MICHIGAN,
Williams Coll., Williamstown, Mass.
For primary bibliographic entry see Field 02H.
W74-01184

SEDIMENT TRANSPORT IN A COASTAL PLAIN ESTUARY,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 02L.
W74-01185

SHIFTING OFFSHORE BARS AND HARBOR SHOALING,
United States Lake Survey, Detroit, Mich.
L. Bajorunas, and D. B. Duane.
Journal of Geophysical Research, Vol 72, No 24, p 6195-6205, December 15, 1967. 13 fig, 6 ref.

Descriptors: *Lake Superior, *Coasts, *Littoral drift, Erosion, Lakes, Harbors, Shoals, *Currents (Water), Shallow water, Sand bars.
Identifiers: Ice foot, *Offshore bars.

Movement of offshore bars in Lake Superior produces alternating accretion and erosion of the nearshore area and causes pulsation in littoral drift. Extensive formation of ice foots contribute to significant erosion in front of them. Harbor structures extending into the lake shift offshore bars, modify coastal currents, and cause shoaling in the lee. The pattern of harbor shoaling was established, and its relationship with the shifting of offshore bars and existing currents was analyzed. The bar in shallow water was feeding material to the shoal and the currents determined the pattern of deposition. (Sinha-OEIS)
W74-01191

LITTORAL ZONE TIDAL-CYCLE SEDIMENTATION,
Brooklyn Coll., N.Y. Dept. of Geology.
M. L. Schwartz.
Journal of Sedimentary Petrology, Vol 37, No 2, p 677-683, June 1967. 3 fig, 4 tab, 5 ref.

Descriptors: *Sediment transport, *Beaches, Sands, Littoral, *Sedimentation, *Coasts, Shallow water.
Identifiers: *Tidal cycle.

A depth integrated fluorescent tracer procedure was developed in order to study the movement of individual sand grains along the beach profile. The following pattern of littoral zone tidal-cycle sedimentation was derived from the collected data: During flood tide a small portion of the sediment eroded in the lower backwash scour zone is deposited just seaward of the upper swash limit. It consists mainly of the finer grain sizes of the beach sand. Most of the eroded sediment, including a large part of the coarse grains, is deposited in the building of the step under the breaker zone. There is a slight diffusion of fine grains seaward of the step to the shoaling wave zone. Sediment moved landward with the advance of the breaker zone is concentrated at the step. Ebb tide sedimentation is similar, but two slight differences can be discerned. The fine sediment eroded as the lower backwash scour zone is translated seaward is deposited seaward of the upper swash limit; however, as it is being deposited in a former scour zone it serves to restore the beach profile to its original form. Then too, there is little net diffusion of fine sediment to the shoaling wavezone when the breaker zone has returned to its original low-tide position. In upper swash deposition and step deposition there is a reversal of the sediment relative to the vertical position it held in the scour zone. (Sinha-OEIS)
W74-01192

SHORELINE PROCESSES NEAR BARROW, ALASKA: A COMPARISON OF THE NORMAL AND THE CATASTROPHIC,
Tufts Univ., Medford, Mass. Dept. of Geology.
For primary bibliographic entry see Field 02L.
W74-01193

THE EQUILIBRIUM BEACH,
Florida State Univ., Tallahassee. Dept. of Geology.
W. F. Tanner.
Transactions, American Geophysical Union, Vol 39, No 5, p 889-891, October 1958. 6 ref.

Descriptors: *Beaches, Littoral drift, Sands, *Equilibrium, *Sedimentation, *Shore protection.

The equilibrium beach has curvature and sand-prism characteristics adjusted to each other so delicately that the potential littoral motion provides precisely the energy needed to transport the detritus supplied at the up-current end. The time element in this balance is long-term rather than instantaneous. A beach which performs in any other way is not in equilibrium. The maintenance of certain beaches in equilibrium form is of great economic or political importance. The most pressing case of inequilibrium is that of the rapidly retrograding beach. In many instances the beach can be restored to an equilibrium condition by decreasing the actual littoral drift or increasing the available supply of sand. (Sinha-OEIS)
W74-01195

BEACH EQUILIBRIUM AND SECOND-ORDER WAVE THEORY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
For primary bibliographic entry see Field 02E.
W74-01201

LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES,
Scripps Institution of Oceanography, La Jolla, Calif.
D. L. Inman, and J. D. Frautschy.
In: Coastal Engineering Santa Barbara Specialty Conference, October 1965, American Society of Civil Engineers. p 511-536 (1966). 9 fig, 26 ref.

Descriptors: *Beaches, *Sediment transport, Littoral zone, Energy, *Circulation, *California, Inlets (Waterways).

Basic principles bearing on the nature of beaches and processes that act to modify them are considered in the light of present coastal development demands. A working hypothesis is developed that applies the principle of the conservation of mass to the mechanics of granular-fluid media. This hypothesis appears to have general application to sand transport processes in the littoral zone. Consideration is given to methods of providing sand sources and methods of decreasing the longshore transport rates of sand as well as to the creation of new beaches and shorelines. Additional research must be done to provide basic information in some critical areas before application can be made with assurance. (Sinha-OEIS)
W74-01212

SAND MOVEMENT ALONG EQUILIBRIUM BEACHES NORTH OF SAN FRANCISCO,
California Univ., Berkeley. Hydraulic Engineering Lab.
J. A. Cherry.
Journal of Sedimentary Petrology, Vol 36, No 2, p 341-357, June 1966. 11 fig, 1 tab, 37 ref. NSF G-18123.

Descriptors: *Sediment transport, *Coasts, *Beaches, *California, Currents (Water), Waves (Water), Equilibrium, Refraction (Water waves), Sands.
Identifiers: Swell, Heavy metals.

Many sandy shorelines along open coasts have relatively permanent configurations which often are the result of an equilibrium adjustment between the predominant swell waves, the predominant conditions of littoral sand movement and the rate of sand supply. The sand movement along several stretches of equilibrium shoreline near Point Reyes was studied using two methods: (1) common techniques of tracing heavy minerals and (2) theoretical predictions based on swell data and diagrams of wave travel in shallow water. Patterns of heavy mineral distribution in the beach

and offshore sands established that negligible net movement of sand occurs along the beaches and that no significant supply of sand is being added to the beaches at present. Analysis of the predominant littoral and offshore waves showed that the sand transportation which was anticipated on the basis of predicted currents generated by the predominant swell coincides with that indicated by the heavy mineral patterns. (Sinha-OEIS)
W74-01213

EROSION OF TIDAL FLATS NEAR GEORGETOWN, BRITISH GUIANA,
Geological Survey Dept., Georgetown (Guyana).
D. D. Hawkes.
Nature, Vol 196, No 4850, p 128-130, October 13, 1962. 3 fig, 5 ref.

Descriptors: Mud flats, *Erosion, Deposition, *Intertidal areas, *Tidal effects, *Coasts, South America.
Identifiers: *British Guiana (Georgetown), *Tidal flats.

The British Guiana Coast is mainly an accretional coast which has been built up in recent times by the accumulation of mud flats. This deposition of mud is interrupted locally and temporarily by erosional periods. An erosion mechanism is described which is most effective in calm weather but in its cumulative effect is probably more important than storm weather erosion. An upper tidal and flat, which is covered by about a foot of water at high tide, is bounded by a low cliff step, below this a wide mud flat extends to the low water level. Blocks of dried-up clay fell from the step on to the soft mud below. Water swirling around these blocks removes loose mud from the edges and they sink deeper into the soft mud. Then turbulence in the water tends to rotate the blocks so that they cut out a pot hole in the mud which tends to grow larger and larger while the original mud block becomes smaller and more spherical. Loose mud drilled out is carried away by the tidal motion of the water. The effect of this pothole drilling, which is most effective within 50 ft of the cliff step causes appreciable changes in the topography of the floor, even in a twelve hour intertidal period. (Sinha-OEIS)
W74-01216

THE EFFECT OF SAND DEPOSITION UPON THE MACRO-INVERTEBRATE FAUNA OF THE RIVER CAMEL, CORNWALL,
Cornwall River Authority, Launceston (England).
For primary bibliographic entry see Field 02I.
W74-01244

A SIMPLE PORTABLE FIELD NEPHELOMETER,
For primary bibliographic entry see Field 07B.
W74-01247

THE OXYGEN STATUS OF LAKE SEDIMENTS,
R. H. Howeier.
J Environ Qual, Vol 1, No 4, p 366-371, 1972, Illus.
Identifiers: Lakes, Mathematical models, Minerals, *Oxygen, Sediments, *Lake sediments, Diffusion models.

The presence of O2 in the surface layer of sediments greatly affects the abundance and availability of Fe, Mn, nitrates, phosphates, and sulfates. The concentration of O2 in the oxidized layer depends on the balance between the rate of O2 diffusion into the sediment and the rate of consumption by the sediment. Several mathematical diffusion models were developed to describe this relationship between diffusion and consumption. With these models the flux of O2 across the water-mud interface and the thickness of the oxidized zone can be calculated. Experimental testing of the models showed that the steady state O2 consumption rates were proportional to the square root of the O2 concentration at the mud surface. The relative contribution of biological and chemical O2 consumption depended mainly on the organic matter content of the sediment, the biological consumption being highest in high-organic matter soils. Determination of the Fe distribution near the sediment surface showed that Fe diffused upward from the reduced soil and accumulated in the oxidized zone. This freshly precipitated Fe could function as a phosphate sink, absorbing phosphates from the water and storing it in the sediment.--Copyright 1973, Biological Abstracts, Inc.
W74-01266

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-01268

A ROLE OF SEDIMENT TRANSPORT IN ALLUVIAL CHANNELS,
Geological Survey, Washington, D.C.
T. Maddock, Jr.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10130, p 1915-1931, November 1973. 12 fig, 18 ref, append.

Descriptors: *Sediment transport, *Bed load, Alluvial channels, Scour, Sedimentation, Erosion, Suspended load, Velocity.

Once a critical amount of sediment is being moved in an alluvial channel, velocity can be expressed as a function of slope and of size and composition of the moving sediment load. Depth is a redundant parameter. At sediment transport rates below critical, depth is an effective parameter. Methods of determining the size and composition of the moving sediment load are analyzed as is the problem of determining when depth becomes redundant. The phenomena of fill and scour at alluvial channel sections is also considered. (Knapp-USGS)
W74-01272

ANALYSIS OF SEDIMENT SORTING IN ALLUVIAL CHANNELS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
S. A. Rana, D. B. Simons, and K. Mahmood.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10168, p 1967-1980, November 1973. 8 fig, 2 tab, 12 ref, append.

Descriptors: *Sediment sorting, *Alluvial channels, *Abrasion, *Sediment transport, Bed load, Mathematical models.

Bed material size in alluvial channels is reduced with distance downstream. This size reduction is caused by the physical size attrition of particles (abrasion) and by differential transport of sizes (sorting). A mathematical model is presented to simulate the bed material sorting in alluvial channels. Application of this model to hypothetical channels shows that the sorting coefficient depends on the channel slope, regime of flow, and total bed material transport. Also, it is shown that in channels formed by aggradation of material transported from upstream, strict equilibrium is not possible in the absence of abrasion. (Knapp-USGS)
W74-01274

SEDIMENT TRANSPORT: NEW APPROACH AND ANALYSIS,
Hydraulics Research Station, Wallingford (England).
P. Ackers, and W. R. White.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10167, p 2041-2060, November 1973. 4 fig, 2 tab, 22 ref, append.

Descriptors: *Sediment transport, *Bed load, Alluvial channels, Sedimentation, Suspended load, Particle size, Model studies.

The relationship of sediment transport to fluid flow was studied; physical reasoning leads to dimensionless groupings of the variables, which are different for coarse sediment and for fine sediment because of dissimilar modes of transport. This concept provides a basis for a new analysis of data from flume experiments, and a method for dealing with transitional sizes of sediment is suggested. Analysis of experimental data supports the theory. Predictive equations relate total sediment flux to measurable properties of flow. A preliminary comparison was made with observations from other sources, including natural rivers. (Knapp-USGS)
W74-01279

TECHNIQUES FOR MEASURING LIGHT ABSORPTION SCATTERING, AND PARTICLE CONCENTRATIONS IN WATER,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07B.
W74-01283

C 18-ISOPRENOID KETONE IN RECENT MARINE SEDIMENT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 05A.
W74-01301

OBSERVATIONS OF NET SHORELINE POSITIONS AND APPROXIMATIONS OF BARRIER ISLAND SEDIMENT BUDGETS,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 02L.
W74-01372

A METHOD OF FORECASTING THE BUILDING OF A RIVER BAR (METOD PROGNOZA PEREFORMIROVANIY RECHNOGO BARA),
Moscow State Univ. (USSR). Chair of Gemorphology.
O. I. Samsonov.
Vestnik Moskovskoga Universiteta, Seriya V, Geografiya, No 5, p 92-96, September-October 1971. 1 fig, 5 ref.

Descriptors: *Forecasting, *Deposition (Sediments), *Sediment transport, *Sediment discharge, *Flow, Turbulence, Mixing, Jets, Velocity, Channels, Streams, Shallow water, Equations.
Identifiers: USSR, *River bars.

A method is presented for forecasting the development of a river bar in a shallow-water area protected from the wind. To predict this process, a theory developed at the Moscow State University Department of Geomorphology on jet flow in a shallow offshore zone was used and applied to investigations in zones of turbulent mixing and maximum flow velocities. (Josefson-USGS)
W74-01388

A STUDY OF THE EXCHANGE OF DISSOLVED SOLIDS BETWEEN BOTTOM SEDIMENTS AND WATER OF DIFFERENT WATER BODIES (IZUCHENIYE OBMENA RASTVORENNYMI VESHCHESTVAMI MEZHDU DONNYMI OTLOZHENIYAMI I VODOY RAZLICHNYKH VODOYEMOV),
Moscow State Univ. (USSR). Chair of Hydrology.
M. V. Matrynova.

Vestnik Moskovskoga Universiteta, Seriya V, Geografiya, No 5, p 96-99, September-October 1971. 1 tab, 11 ref.

Descriptors: *Dissolved solids, *Sediment-water interfaces, *Bottom sediments, *Bodies of water, Lake sediments, Model studies, Estimating, Equations.
Identifiers: USSR.

A quantitative estimate is made of the exchange of substances between bottom sediments and water to define the role of bottom sediments in the balance of biogenic elements in bodies of water. Research to determine the quantity of dissolved material released into water from bottom sediments is based on field observations of the distribution of an element on one or both sides of the sediment-water interface and on mathematical simulation. A study of the distribution of components on both sides of the sediment-water interface is, in all probability, the most correct approach to the study of the mechanism of exchange between water and bottom sediments. (Josefson-USGS)
W74-01389

QUATERNARY SHORELINES OF THE SEAS OF OKHOTSK AND JAPAN (CHETVERTICHNYYE BEREGOVYYE LINII OKHOTSKOGO I YAPONSKOGO MOREY),
Akademiya Nauk SSSR, Novosibirsk. Dalnevostochnyi Geologicheskii Institut.
A. P. Kulakov.
Izdatel'stvo 'Nauka' Sibirskoye Otdeleniye, 1973. 188 p.

Descriptors: *Shores, *Oceans, *Quaternary period, Pleistocene epoch, Littoral, Drowned (Submerged), Coasts, Continental margin, Continental shelf, Sea level, Geomorphology, Terraces (Geologic), Stratigraphy, Paleoclimatology, Palynology, Spores, Pollen, Sediments, Sedimentation Islands.
Identifiers: *USSR, *Sea of Okhotsk, *Sea of Japan, *Japan, Kamchatka, Kurile Islands, Sakhalin, Transgression (Stratigraphic), Paleogeography, Tectonics.

Geomorphological structure and development of shorelines in Quaternary time were investigated in studies conducted in 1963-70 on continental shores of the seas of Okhotsk and Japan (from Shelekhova Gulf in the north to Korea Strait in the south) and on the Kamchatka Peninsula, the Kurile and Japanese Islands, and the island of Sakhalin. Origin of marine terraces of island chains is analyzed, and problems of Quaternary geology and paleogeography are discussed. (Josefson-USGS)
W74-01391

CHLORINATED HYDROCARBON INSECTICIDES IN SEDIMENTS OF SOUTHERN LAKE MICHIGAN,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W74-01397

COUPLING CARBON FLOW THROUGH SOME PELAGIC AND BENTHIC COMMUNITIES,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 05B.
W74-01437

MOHAWK LAKE STUDY, BRANTFORD, ONTARIO.

Prepared for Grand River Conservation Authority, Cambridge, Ontario. August, 1972. 15p, 4 photos, 3 append. 6939-01.

Descriptors: *Lakes, *Silting, *Reservoir silting, Sedimentation, Canada, Dredging, Excavation, Costs, Runoff, Spillways, Oxygen demand, Ammonia, Iron, Hydrogen sulfide, Methane.
Identifiers: *Sediment removal, *Canada Mohawk Lake (Ont), Brantford (Ont), Grand River (Ont).

Mohawk Lake is a 35-acre lake in Brantford, Ontario. It is fed by the East Ward Creek, supplemented by a by-pass waterline from the Grand River. Because of an extremely low gradient, the river has silted, with deposits of 220,000 cu. yds. ranging from an average of 3 or 4 to 8 feet deep. Water depth is 8 to 10 feet on top of the sediments. The area surrounding the lake is proposed as a major recreation area, upon completion of an adjacent landfill. In order to establish and maintain recreational activities in the lake, primarily boating, the bottom sediments must be completely removed. This would lower oxygen demands, ammonia, iron, hydrogen sulfide, and methane concentrations. Unless the catch-basin at the head of the lake is extremely effective, the lake will soon silt again. Five alternative schemes for removal of sediment were initially considered and 3 are presented herein. One calls for silt removal by suction dredging. Advantages are least disruption to existing systems, but a liability is that this method does not result in a "clean" lake bottom. Two methods of open excavation are explained. One calls for pumping the lake dry, while another would use gravity to drain the lake into a retention pond and its outlets to the Grand River. Costs are estimated for each method. The gravity drainage and excavation alternative is recommended. Since peak runoff from the watershed is expected to increase 40%, contruction of a second emergency spillway to the Grand River is recommended to prevent flooding. Appendix contains maps and cost estimates. (Stein-North Carolina)
W74-01476

OCCURRENCE AND CUMULATION OF MICROCOMPONENTS IN BOTTOM SEDIMENTS OF DAM RESERVOIRS OF SOUTHERN POLAND,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
For primary bibliographic entry see Field 05B.
W74-01565

2K. Chemical Processes

HYDROLOGIC NUTRIENT CYCLE INTERACTIONS IN UNDISTURBED AND MANIPULATED ECOSYSTEMS (WATERSHEDS),
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 04C.
W74-01110

EVALUATION OF FLAME EMISSION DETERMINATION OF PHOSPHORUS IN WATER,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05A.
W74-01116

CHEMICAL RELATIONSHIPS BETWEEN SURFACE WATER AND THE GROUND IN SOUTH FLORIDA,
Miami Univ., Coral Gables, Fla.
L. J. Greenfield, and C. R. Hare.
Water Resources Bulletin, Vol 9, No 5, p 923-931, October 1973. 4 fig, 4 tab, 7 ref.

Descriptors: *Water chemistry, *Limestones, *Swamps, *Surface-groundwater relationships, Algae, *Florida, *Wetlands, Ion exchange, Acidity, Alkalinity, Hydrogen ion concentration, Peat, Mineralogy, Chemical precipitation, *Cyanophyta.

Analyses of soil and water were made in a stretch of shallow ground north of a cypress head in South Florida. The area is covered with water for part of the year, and it flows slowly southward. The soil is primarily peat formed from the local graminid vegetation during its decay. The top layer consists of a blue-green algal mat whose decay products contribute to the peat. Ion exchange capacity is high enough in all soil layers to account for the ion content within the soil and surrounding waters. It is a very important buffer system that retards limestone erosion. Cation exchange capacity (CEC) values ranged from 20 to 190 meg/100 gm dry soil from bedrock to surface. A large difference between the undersoils and the algal mat is based upon the fact that the synthetic processes are so great in the mat that at peak growth and on sunny days, pH may rise to 8.5.CaCO3, is often precipitated and contributes to the molluscan limestone deposits in this zone. Around tree islands, shading may occlude mat growth, and acidic decay products running off produce 'moats' in the rock. Subsequent filling of the area with peats and decaying mat fragments from upstream produce a layer with a high CEC that retards further erosion. (Knapp-USGS)
W74-01153

THERMODYNAMICS OF ACID-BASE EQUILIBRIA. II. IONIZATION OF M- AND P--HYDROXYBENZOTRIFLUORIDE AND THE CONCEPT OF FLUORINE DOUBLE BOND-NO BOND RESONANCE,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
C. L. Liotta, D. F. Smith, Jr., H. P. Hopkins, Jr., and K. A. Rhodes.
Journal of Physical Chemistry, Vol 76, No 13, p 1909-1912, 1972. 6 tab, 19 ref. OWRR B-049-GA (5). 14-31-0001-3269.

Descriptors: *Thermodynamics, *Acid-Base equilibrium, Enthalpy, Entropy, *Ionization, *Fluorine, Water chemistry, Aqueous solutions, Chemical reactions, *Bonding.
Identifiers: Calorimetric, *Hydroxybenzotrifluoride.

The free energy, enthalpy, and entropy of ionization of p- and m-hydroxybenzotrifluoride in water at 25C have been determined from pKa measurements as a function of temperature. The enthalpy of ionization was also determined by high-precision solution calorimetry. The thermodynamic data for the para and meta isomers are pKa 8.675, 8.950; delta H degree 4.99, 5.24 kcal/mol; and delta S degree -23.0, -23.3 cal/ (deg mole), respectively. The results suggest that double bond-no bond resonance is unimportant in the ionization of p-hydroxybenzotrifluoride.
W74-01226

EFFECT OF THE QUALITY OF WELL WATERS ON SOILS IN GURGAON DISTRICT,
Haryana Agricultural Univ., Hisser (India). Dept. of Soils.
For primary bibliographic entry see Field 02G.
W74-01252

'TRAPPED SEA-WATER' IN RORHOLTFJORDEN,
Oslo Univ. (Norway). Dept. of Limnology.
A. Lande.
Schweiz Z Hydrol, Vol 34, No 1, p 34-40, 1972, Illus.
Identifiers: *Norway (Rorholtfjorden), *Oxygen, Sea water (Trapped), Temperature, *Water samples, Sampling, Hydrogen ion concentration.

On 25 Feb. 1971 some water samples were taken from Rorholtfjorden, Norway, to supply lake information, and if possible record changes in the water for the last 20 yr. The tables contain chemical data, pH, temperature and O2 content. The trapped seawater is also compared with original

seawater with the same chloride content. A so-called semitstagnation (Strom 1957) was not observed. It is possible that about 1 m of the trapped seawater was lost during the last 20 yr because of the removed semi-stagnation.--Copyright 1973, Biological Abstracts, Inc.
W74-01263

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Washington, D.C.

Available from GPO, Washington, DC 20402 - Price $2.10 domestic postpaid or $1.75 GPO Bookstore. Water-Supply Paper 2094, 1973. 293 p, 1 fig, 39 ref.

Descriptors: *Water quality, *Surface waters, *St. Lawrence River, *Mississippi River basin, *Chemical analysis, Tributaries, Sediment transport, Water temperature, Streamflow, Gaging stations, Flow rates, Basic data collections, Water analysis, Illinois, Indiana, Michigan, Minnesota, Missouri, New York, Ohio, South Dakota, Wisconsin.
Identifiers: *Upper Mississippi River basin, *Hudson Bay basin.

The records of chemical analysis, water temperature, and suspended sediment of surface waters are tabulated for the St. Lawrence River Basin, and Hudson Bay and Upper Mississippi River Basins for the 1968 water year (Oct. 1967 to Nov. 1968). The Geological Survey maintained 139 stations on 93 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 81 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 59 and daily at 24 stations. Specific conductance was determined and reported for almost all daily samples. Quantities of suspended sediment are reported for 24 stations. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Particle-size distributions of sediments were determined only at miscellaneous sites. Descriptive statements are given for each sampling station. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. (Woodard-USGS)
W74-01268

CONTRIBUTION TO PHYSICOCHEMICAL STUDY OF SOME SPRINGS OF THE GAPEAU RIVER BASIN (VAR),
J. Ollier.
Bull Mens Soc Linn Lyon. Vol 41, No 3, p 41-48. 1972. Illus.
Identifiers: *France (Gapeau River basin), *Physicochemical studies, River basins, *Springs.

The physicochemical conditions (temperature, pH, chemical constituents, comparative ion ratios) of waters of some Gapeau river basin springs were briefly discussed based upon results of monthly samplings conducted from 1967-1968. The 7 springs studied (Gapeau, Beaupre, Nai, la Servie, Thon, Font-Freye, Pignans) are characterized by their constant temperature (except for the Pignans spring which varies according to season), their alkaline pH (except for the Pignans which is acidic), and their ionic heterogeneity.--Copyright 1973, Biological Abstracts, Inc.
W74-01288

STORAGE AND PROCESSING OF WATER QUALITY DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W74-01293

APPLICATION OF INFRARED FOURIER TRANSFORM SPECTROSCOPY TO ANALYSIS OF MICRO SAMPLES,
Dow Chemical Co., Midland, Mich. Analytical Labs.
S. S. King.
Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 526-530, July/August 1973. 4 fig, 3 ref.

Descriptors: *Chemical analysis, *Pollutant identification, Organic compounds, *Sampling, Methodology.
Identifiers: *Microanalysis, *Infrared spectroscopy, Micro sampling techniques, Trace levels, Infrared spectra.

A Fourier transform mid-infrared spectrometer equipped with 6X bean condenser has been used to record infrared spectra of samples in submicrogram quantities. Emphasis was placed on a study of micro sampling techniques. Several techniques were tried to transfer micro quantities of samples from dilute solution to KBR substrate. The most efficient method found was to transfer a few microliters of the solution onto 0.1-0.4 mg of KBr powder by using a 10-microliter microsyringe. The solvent was evaporated slowly on the KBr powder, which was attached to the end of the syringe needle. The KBr powder was then pressed into a 0.5-mm diameter disk. Ir spectra of solutions were obtained by placing the samples in a special 1-mm path microcavity cell. All spectra recorded in this study were obtained at a resolution of 4/cm. By improving the sample handling techniques and by utilizing the advantages of the ft-ir spectrometer, it was found that the analysis of submicrogram quantities of samples by this method is practical. This setup is ideal for the identification of small particles which can be as small as 0.05 mm in diameter. If the sample is in dilute solution, it is possible to obtain a usable infrared spectrum of 0.05-microgram samples. (Holoman-Battelle)
W74-01303

EVALUATION OF THE USE OF THE HEATED GRAPHITE ATOMIZER FOR THE ROUTINE DETERMINATION OF TRACE METALS IN WATER,
State Univ., Coll., Fredonia, N.Y. Dept. of Geology.
For primary bibliographic entry see Field 05A.
W74-01316

A COMPARISON OF FAST DESTRUCTION METHODS FOR THE DETERMINATION OF TRACE METALS IN BIOLOGICAL MATERIALS,
Brussels Univ. (England). Pharmaceutical Inst.
For primary bibliographic entry see Field 05A.
W74-01317

IMPROVED DISTILLATION METHOD FOR VOLATILE ACIDS ANALYSIS,
Somerset Raritan Valley Sewerage, Somerville, N.J.
For primary bibliographic entry see Field 05A.
W74-01322

LITERATURE ON MERCURY: AVAILABILITY OF ENGLISH TRANSLATIONS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05A.
W74-01323

CRITICAL STUDY OF THE APCD-MIBK EXTRACTION SYSTEM FOR ATOMIC ABSORPTION,
Missouri Univ., Columbia. Dept. of Agricultural Chemistry.
For primary bibliographic entry see Field 05A.
W74-01329

NOVEL METHOD OF RAMAN DATA ACQUISITION,
Campinas Univ. (Brazil). Gleb Wataghin Inst. of Physics.
J. E. Moore, and L. M. Fraas.
Analytical Chemistry, Vol 45, No 12, p 2009-2014, October 1973. 6 fig, 14 ref.

Descriptors: *Methodology, *Organic compounds, Molecular structure, Data collections.
Identifiers: *Raman spectroscopy, *Data acquisition, Enhancement, Selective phonon population, Data interpretation, Fluorescence discrimination, Resonant Raman enhancement.

Signal-to-noise information is presented that supports the feasibility of a novel approach to the acquisition of Raman data. In this approach, the fluorescence background interference common in many Raman experiments, is minimized through selective phonon population enhancement. The disadvantages of the proposed experimental technique are: a system must be constructed to comply with the experimental requirements and problems lying in the area of interpretation of acquired data. Although with simple organic molecules, a well known application of Raman data is in the use of vibrational analysis as a tool to accomplish structure elucidation, it may be impossible to assign spectra of large molecules, because of their complexity, to fundamental modes. It will be possible in many cases with good spectra to identify functional groups. Resonant enhancement could be a means of compensating for the weaker scattering cross sections of resonance for biochemical samples. With modified experimental techniques, the acquisition of Raman data of large molecules is quite possible. (Holoman-Battelle)
W74-01330

AUTOMATED RAPID SCAN INSTRUMENT FOR SPECTROELECTROCHEMISTRY IN THE VISIBLE REGION,
Naval Research Lab., Washington, D.C. Electrochemistry Branch.
E. E. Wells, Jr.
Analytical Chemistry, Vol 45, No 12, p 2022-2026, October 1973. 4 fig, 1 tab, 15 ref.

Descriptors: *Chemical reactions, *Automatic control, *Monitoring, Computers, Spectrophotometry, Instrumentation, Laboratory equipment, Data processing.
Identifiers: *Scanning spectrophotometer, Nitrobenzene, Dimethyl sulfoxide, Sensitivity, Absorbance, Spectroelectrochemistry.

An instrument which uses a computer to control and collect data from a rapid scanning visible spectrophotometer, and which simultaneously operates a potentiostat to control generation of electrochemical intermediates is described. The 370-700 nm spectral range may be swept in as little as 5 msec, and by using real time control to zero the spectral background repetitive spectra may be signal averaged to give an ultimate sensitivity of 0.00001 absorbance unit. For peak monitoring at fixed wavelength, data may be taken as soon as 20 microseconds after the application of the reaction initiating potential step. The performance of the system is illustrated with results from millimolar solutions of nitrobenzene in dry dimethyl sulfoxide after stepping the potential into the limiting current region. (Little-Battelle)
W74-01331

CHEMICAL CONSTANTS OF METAL COMPLEXES FROM A COMPLEXOMETRIC TITRATION FOLLOWED WITH ANODIC STRIPPING VOLTAMMETRY,
North Carolina Univ., Chapel Hill. School of Public Health.
For primary bibliographic entry see Field 05A.
W74-01332

ANION RESPONSES AND POTENTIAL FUNCTIONS FOR NEUTRAL CARRIER MEMBRANE ELECTRODES,
North Carolina Univ., Chapel Hill. William R. Kenan, Jr. Lab. of Chemistry.
J. H. Boles, and R. P. Buck.
Analytical Chemistry, Vol 45, No 12, p 2057-2062, October 1973. 8 fig, 2 tab, 24 ref.

Descriptors: *Anions, *Electrochemistry, *Zeta potential, Physical properties, Aqueous solutions, *Electrolytes, Electrical properties, *Electrodes, Solubility, Oil, Equipment.
Identifiers: Potassium electrodes, Neutral carrier membrane electrodes, Response time, Ion selective electrodes, Picrates, Thiocyanates, Propionates, Cyclohexane butyrate, Benzene sulfonate, Benzoates, Potassium salts, Membrane electrodes, Ion pairing, Valinomycin electrodes.

Responses of Orion valinomycin-based, neutral carrier, potassium-selective electrodes have been measured for aqueous electrolytes containing oil-soluble anions. The results suggest a generalization of the Ciani-Eisenman-Szabo equation to include anion solubility, mobility, and ion pairing. This equation, which reduces to the CES form, encompasses Nernstian response to cations or anions in extreme cases. A counter proposal using the Teorell-Myers-Sievers model is also developed. Both are consistent with limited potentiometric observations, although only the former predicts that a given membrane may be anion or cation responsive depending upon intrinsic anion or cation membrane solubilities. Preferential solubilization can be enforced by addition of solubilizing agents such as valinomycin to aid selective response. Conditions for reduced slopes and maxima in potentiometric response curves are discussed. In addition, a response function is derived following the fixed-site hypotheses of Kedem, Perry, and Bloch. Distinctions between the theories are not possible solely from potentiometric cation response measurements. (Holoman-Battelle)
W74-01334

VERSATILE COMPUTER GENERATED VARIABLE ACCELERATING VOLTAGE CIRCUIT FOR MAGNETICALLY SCANNED MASS SPECTROMETERS. USE FOR ASSAYS IN THE PICOGRAM RANGE AND FOR ASSAYS OF STABLE ISOTOPE TRACERS,
Washington Univ., St. Louis, Mo. Biomedical Computer Lab.
W. F. Holmes, W. H. Holland, B. L. Shore, D. M. Bier, and W. R. Sherman.
Analytical Chemistry, Vol 45, No 12, p 2063-2071, October 1973. 8 fig, 16 ref.

Descriptors: *Assay, *Organic compounds, *Chemical analysis, *Stable isotopes, Computers, Computer programs, Electronic equipment, Tracers, *Mass spectrometry, Spectrometers, Amino acids, Carbohydrates, Electrical equipment.
Identifiers: *Trace levels, Magnetically scanned mass spectrometers, Accelerating voltage circuits, Precision, Sensitivity, Computer-D/A converter interface, Digital to analog converters, Myo-inositol, Alanine, Glucose, Accuracy, Circuits.

A circuit has been designed for magnetically scanned mass spectrometers that allows computer generation of any desired accelerating voltage change use to 2000 volts, using a 15-bit D/A converter, a high voltage amplifier, plus floating the standard accelerating voltage power supply. A 15-bit D/A converter interface for use with PDP-81 and PDP-12 computers has been built from two logic modules. The circuit appears to have considerable application for upgrading existing magnetically scanned mass spectrometers where there is a need for increased sensitivity for measuring selected fragment ions or increased accuracy for isotope ratio measurements. Using this circuit, a program has been written for the PDP-12 computer that measures the intensities of eight fragment ions. Exact masses are typed into the computer and the appropriate accelerating voltages generated. Results are presented showing a linear assay for picogram levels of myo-inositol, and the precision of assays for deuterated alanine and glucose. (Holoman-Battelle)
W74-01335

INVESTIGATION OF SPECTRAL OVERLAP OF THE NEON 359.352-NM AND CHROMIUM 359.349-NM SPECTRAL LINES IN ATOMIC ABSORPTION AND ATOMIC FLUORESCENCE SPECTROMETRY OF CHROMIUM,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
J. D. Norris, and T. S. West.
Analytical Chemistry, Vol 45, No 12, p 2148-2150, October 1973. 2 fig, 17 ref.

Descriptors: *Water analysis, *Aqueous solutions, *Chromium, *Metals, Laboratory equipment.
Identifiers: *Atomic absorption spectrophotometry, *Atomic fluorescence spectroscopy, Electrodeless discharge lamps, Neon lamps, Detection limits, Calibration curves.

Neon electrodeless discharge lamps (EDL) were prepared to study their usefulness in analyzing aqueous solutions of chromium by atomic fluorescence and atomic absorption. Power and emission intensity relationships showed that best results were obtained with lamps pressurized at 5 Torr and operated at 25-30 W incident power. Atomic fluorescence at 359 nm gave a detection limit of 2.5 ppm Cr using a monochromator slit-width which corresponded to a spectral band-pass of 6 nm. The analytical curve was linear up to about 50 ppm. Atomic absorption at 359.3 nm gave a detection limit of 0.8 ppm. The analytical curve in the range of 1 to 250 ppm was slightly curved toward the concentration axis and passed through the origin. It is concluded that neon EDL's, because of the linearity of analytical curves produced, should be useful for fluorescence and atomic absorption of chromium even though detection limits are poorer than those obtained with chromium sources. (Little-Battelle)
W74-01337

INDIRECT COULOMETRIC TITRATION OF BIOLOGICAL ELECTRON TRANSPORT COMPONENTS,
Ohio State Univ., Columbus. Dept. of Chemistry.
F. M. Hawkridge, and T. Kuwana.
Analytical Chemistry, Vol 45, No 7, p 1021-1027, June 1973. 7 fig, 2 tab, 29 ref.

Descriptors: *Electrochemistry, *Energy transfer, *Cytological studies, Oxidation-reduction potential, *Volumetric analysis, Oxidation, Methodology, Chemical reactions.
Identifiers: *Electron transport, Coulometric titration, Stoichiometry, Heme proteins, Bioenergetics, Enzyme kinetics, Potassium ferrocyanide, Methyl viologen, Myoglobin, 1 1'-Dimethyl-4 4'-bipyridyl dichloride, 1 1'-Ethylene-2 2'-bipyridyl dichloride, Optically transparent electrodes, Cytochrome c, Cytochromes.

The approach of utilizing an electrochemically generated titrant to transfer charge to an electron carrier enzyme has been demonstrated in the mediator/spinach ferredoxin-NADP-reductase/NADPH system. Present work describes further developments aimed toward the general application of spectroelectrochemical methods using optically transparent electrodes (OTE's) to evaluate the stoichiometry, energetics, and kinetics of enzymatic electron transfer sequences. Electrochemical and spectral data indicate that reagents such as potassium ferrocyanide, 1,1'-dimethyl-4,4'-bipyridyl dichloride (methyl viologen), and 1,1'-ethylene-2,2'bipyridyl dichloride can also act as electron mediators and that their essential properties are unaffected by the presence of a protein. These reagents undergo electron transfer at the electrode and in turn transfer charge to the enzyme. Anaerobic redox titrations (O2 less than or equal to 0.5 microM) of horse heart cytochrome c, modified horse heart cytochrome c, and sperm whale myoglobin are reported. Results indicate that the n values of these heme proteins can be evaluated within plus or minus 3 percent of the expected values. Concurrent potentiometric data have also been obtained for certain titrations. Experimental details of cell design, oxygen removal by vacuum degassing, procedures in charge injection, and the rapid acquisition of spectral information are discussed. (Holoman-Battelle)
W74-01338

SIMPLE INEXPENSIVE FREEZE-DRYING PROCEDURE,
Bureau of Alcohol, Tobacco and Firearms, Cincinnati, Ohio.
For primary bibliographic entry see Field 07B.
W74-01339

LATERAL DIFFUSION INTERFERENCES IN FLAME ATOMIC ABSORPTION AND EMISSION SPECTROMETRY,
Ames Lab., Iowa.
A. C. West, V. A. Fassel, and R. N. Kniseley.
Analytical Chemistry, Vol 45, No 9, p 1586-1594, August 1973. 10 fig, 6 tab, 28 ref.

Descriptors: *Chemical analysis, *Solutes, *Metals, Aluminum, Molybdenum, Cobalt, Calcium, Titanium, Potassium, Sodium, *Spectrophotometry.
Identifiers: Lateral diffusion interference, *Flame absorption, *Flame emission, Concomitants, Vanadium, Atomic absorption spectrophotometry, Flame emission spectroscopy, Reproducibility, Silver, Tungsten, Chemical interference, Sulfuric acid, Analytes.

Reported are results of detailed studies on the effect of concomitants on Al, Mo, and V absorption and emissions signals in nitrous oxide-acetylene flames supported on linear slot burners. Extensive unequivocal experimental evidence is presented to show that the horizontal distribution of the analyte free atoms across a linear slot burner flame may be markedly affected by the presence of concomitants. The effect of these concomitants, classified as a lateral diffusion interference, is to increase the concentration of analyte free atoms along the linear center of the flame and to decrease their concentration at the edges. This study of Al, Mo, and V confirms the existence of such enhancements and attributes them predominantly to changes in the horizontal distribution of analyte free atoms or molecules across the flame profile. This redistribution was first observed by Koirtyohann and Pickett in 1968. Because the elements studies form stable monoxides, oxide formation at the edges of the flame due to entrained air obscures edge depressions accompanying the enhancements in the cent of unshielded flames. The interferences were therefore observed in an argon-shielded flame and confirmed in an unshielded flame with metals forming less stable oxides. The following mechanism is proposed to explain this type of interference: The concomitant delays in atomization of spray droplets or solid particles, thus shortening the time available for lateral diffusion in the flame by analyte atoms or

molecules before they reach the optical path. The analyte free atoms or molecules are therefore concentrated in the center of the flame and depleted at the edges. (Holoman-Battelle)
W74-01342

NEW DETECTOR FOR ION-EXCHANGE CHROMATOGRAPHY,
Cincinnati Univ., Ohio. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01343

FLUOROMETRIC QUANTITATION OF GALLIUM IN BIOLOGICAL MATERIALS AT NANOGRAM LEVELS,
Research Triangle Inst., Durham, N.C.
R. A. Zweidinger, L. Barnett, and C. G. Pitt.
Analytical Chemistry, Vol 45, No 8, p 1563-1564, July 1973. 3 tab, 14 ref.

Descriptors: *Fluorometry, Separation techniques, Heavy metals.
Identifiers: *Biological samples, *Sample preparation, *Tissue, *Gallium, *Ion exchange chromatography, Recovery, Detection limits, Chemical interference, Acid digestion, Elution.

Samples of biological material were analyzed for gallium by anion exchange chromatography. Ascorbic acid reduction of Fe (III) was used after the chromatography, and the fluorometric reagent was Lumogallion. Samples were digested by boiling in sulfuric and nitric acid, treated with C104, diluted with water and HC1, the resulting solution applied to Dowex 1-X8 resin, and the Ga eluted with HC1. The eluted Ga was treated with ascorbic acid, Na2S203, and Na2CO3, Lumogallion added, the resulting complex extracted with isoamyl alcohol, and the fluorescence read at 570 nm with 490-nm excitation. The detection limit with mouse tissue was 15 ng/g with average recovery of 100 percent. Fe (II), Al, and Cu either did not interfere or their interference was eliminated by the procedure. (Little-Battelle)
W74-01344

PREVENTION OF SELENIUM INTERFERENCE WITH MEASUREMENT OF PHOSPHATE AS ITS MOLYBDENUM (V-VI) COMPLEX,
New South Wales Dept. of Agriculture, Rydalmere (Australia). Biological and Chemical Research Inst.
For primary bibliographic entry see Field 05A.
W74-01345

SOLVENT EXTRACTION OF METAL 1,10--PHENANTHROLINE COMPLEXES AND CONCENTRATION OF TRACE AMOUNTS OF METAL IONS PRIOR TO SPECTROPHOTOMETRIC OR FLAME PHOTOMETRIC DETERMINATION,
Northern Illinois Univ., DeKalb. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01354

SIMPLE DIRECT COMBINATION OF GAS CHROMATOGRAPHY AND VAPOR PHASE INFRARED SPECTROMETRY,
For primary bibliographic entry see Field 05A.
W74-01355

DETERMINATION OF LOW CONCENTRATIONS OF COBALT IN PLANT MATERIAL BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Western Australia Univ., Nedlands. Inst. of Agriculture.
W. J. Simmons.
Analytical Chemistry, Vol 45, No 11, p 1947-1949, September 1973. 3 tab, 11 ref.

Descriptors: *Cobalt, *Plant tissues, *Pollutant identification, *Chemical analysis, *Methodology, Heavy metals, Potassium, Phosphorus, Calcium, Magnesium, Iron, Manganese, Zinc, Copper, Chemical degradation, Wheat, Clovers.
Identifiers: *Atomic absorption spectrophotometry, Chemical interference, Chemical recovery, Precision, Accuracy, Sample size, Organic solvents, 2-Nitroso-1-naphthol, Methyl isobutyle ketone, Sample preparation, Yellow lupin, Lucerne, Biological samples, Environmental samples.

An atomic absorption procedure is described which is an alternative to the AA method of Jago et al. (1971) for determining low concentrations of Co in plant material. This method has the same sensitivity but utilizes a different complexing agent (2-nitroso-1-naphthol), pH (6.0-6.4), and final solvent (MIBK) for the extraction and concentration of Co. When Co-57 was added to four 5-g samples of lucerne prior to digestion, recoveries of activity in the MIBK solution were quite satisfactory. The mean recovery was 98.8 percent with a standard deviation of 0.8 percent. The Effect of relatively high concentrations of eight of the most common of these elements on the determination of added Co was examined. None of the salts added interfered seriously with the recovery of added Co. Sample weight had no effect on the Co concentration of any of the plant materials analyzed indicating that the method is free of constant bias. The problem of nebulizer blockage encountered with another procedure was prevented by the removal of excess 2-nitroso-1-naphthol with NsOH. Over 1000 samples have been analyzed using the proposed procedure and not once has the nebulizer blocked. The method is superior to the colorimetric procedure because small sample weights can be used. For Co concentrations as low as 0.08 microgram/g, sample weights of as little as 2 have satisfactory precision and accuracy. At even lower Co concentrations, 5-g samples give adequate precision and accuracy. (Holoman-Battelle)
W74-01356

PRECOLUMN INLET SYSTEM FOR THE GAS CHROMATOGRAPHIC ANALYSIS OF TRACE QUANTITIES OF SHORT-CHAIN ALIPHATIC AMINES,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 05A.
W74-01357

A SYSTEMATIC STUDY OF THE VARIABLES INVOLVED IN THE REVERSE-PHASE THIN--LAYER CHROMATOGRAPHY OF OXYETHYLATED ALKYL SULFATE SURFACTANTS,
Beaver Coll., Glenside, Pa.
For primary bibliographic entry see Field 05A.
W74-01358

THE DETERMINATION OF LEAD AND NICKEL BY ATOMIC-ABSORPTION SPECTROMETRY WITH A FLAMELESS WIRE LOOP ATOMIZER,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01363

EXTRACTION-PHOTOMETRIC DETERMINATION OF URANIUM (IV) WITH CHLOROPHOSPHONAZO-III,
Japan Atomic Energy Research Inst., Tokai.
For primary bibliographic entry see Field 05A.
W74-01364

EVALUATION OF THE ACCURACY OF GRAN PLOTS BY MEANS OF COMPUTER CALCULATIONS. APPLICATION TO THE POTENTIOMETRIC TITRATION OF THE TOTAL ALKALINITY AND CARBONATE CONTENT IN SEA WATER,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
I. Hansson, and D. Jagner.
Analytica Chimica Acta, Vol 65, No 2, p 363-373, July 1973. 2 fig, 4 tab, 26 ref.

Descriptors: *Evaluation, *Computers, *Volumetric analysis, Sea water, Alkalinity, Carbonates, Mathematical studies, Water chemistry, Water quality, Equations.
Identifiers: *Gran plots, *Data interpretation, Accuracy, Potentiometric titration, Stability constants, Errors.

The use of computer calculations is deomonstrated for the determination of the systematic errors associated with Gran plots. The results of such calculations are used to derive 'modified' Gran plots capable of locating the equivalence point both more accurately and more precisely. The general principles are exemplified by application to the determination of the total alkalinity and carbonate content in seawater by means of potentiometric titration. (Holoman-Battelle)
W74-01365

SEPARATION OF POLYPHOSPHATES BY PAPER CHROMATOGRAPHY WITH A NEW SOLVENT,
Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Chemical Development.
For primary bibliographic entry see Field 05A.
W74-01366

A STUDY OF THE EXCHANGE OF DISSOLVED SOLIDS BETWEEN BOTTOM SEDIMENTS AND WATER OF DIFFERENT WATER BODIES (IZUCHENIYE OBMENA RASTVORENNYMI VESHCHESTVAMI MEZHDU DONNYMI OTLOZHENIYAMI I VODOY RAZLICHNYKH VODOYEMOV),
Moscow State Univ. (USSR). Chair of Hydrology.
For primary bibliographic entry see Field 02J.
W74-01389

CONCENTRATIONS OF DISSOLVED FORMS OF FE, MN, AND CU IN MARINE PORE WATERS OF THE ATLANTIC BASIN (KONTSENTRATSII RASTVORENNYKH FORM FE, MN, I CU V MORSKIKH, POROVYKH VODAKH BASSEYNA ATLANTICHESKOGO OKEANA),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
Ye. M. Yemel'yanov, and N. B. Vlasenko.
Geokhimiya, No 10, p 1268-1277, October 1972. 2 fig, 6 tab, 19 ref.

Descriptors: Geochemistry, *Dissolved solids, *Metals, *Pore water, *Atlantic Ocean, Sea water, Depth, *Iron, *Manganese, *Copper, Oxidation, Reduction (Chemical), Analytical techniques, Maps.
Identifiers: USSR, Oozes, Upwelling (Currents).

Concentrations of Fe, Mn, and Cu in waters of the Atlantic Ocean are lower than those in river waters. Surface waters of the sea contain 3 to 24 micrograms of reactive Fe per liter. Maximum concentrations occurred in waters along coasts, near river mouths and volcanic islands and in areas of deep upwelling. Minimum concentrations occurred along coasts of North America (Gulf Stream, Sargasso Sea). The content of organic (colloidal) Fe is 2-10 times that of the reactive form. The content of dissolved Mn in the upper layer of Atlantic waters varies between 0.5 and 32.0 micrograms/liter and in deep waters (25-5,000 m) is 0.5 to 12.0 microgram/liter. Maximum amounts occurred in shelf waters at the mouth of the Congo River, and minimum amounts were found in the 25-150 m active layer of the Angola

Depression. The content of Mn in pore waters varies between 27.5 and 1,500 micrograms/liter. Highest concentrations occurred in reduced muds of the Baltic Sea and off the Congo coast, and minimum concentrations were found in oxidized foraminiferal oozes on the mid-Atlantic Ridge. The content of Cu in surface waters of the sea varies between 0.5 and 10.3 micrograms/liter and in deep waters (50-5,000 m) is 1.5 to 7.0 micrograms/liter. Highest Cu concentrations (5 to 10.3 micrograms/liter) occurred in areas of upwelling. The Cu concentration in pore waters is quite high (12.0 to 110.0 micrograms/liter.0. concentrations of reactive Fe, Mn, and Cu vary slightly with depth, while the content of organic Fe increases at depths of 200-1,500 m or more. (Josefson-USGS)
W74-01392

ISOTOPIC COMPOSITION OF OXYGEN AND HYDROGEN IN SULFIDE WATERS OF THE SOCHI-ADLER ARTESIAN BASIN (IZOTOPNYY SOSTAV KISLORODA I VODORADA SUL'FIDNYKH VOD SOCHI-ADLERSKOGO ARTEZIANSKOGO BASSEYNA),
Moskovskii Geologorazvedochnyi Institut (USSR).
L. V. Gorbushina, V. Ye. Vetshteyn, G. A. Malyuk, Ye. V. Iosifova, and R. R. Arutyunyants.
Geokhimiya, No 9, p 1102-1106, September 1972. 2 fig, 1 tab, 22 ref.

Descriptors: *Isotope studies, *Oxygen isotopes, *Deuterim, *Sulfides, Water types, Connate water, Sea water, Freshwater, Groundwater, Surface waters, Mass spectrometry.
Identifiers: *USSR (Krasnodar Territory), *USSR (Sochi-Adler artesian basin), Mineralization.

Isotopic composition of deuterium and oxygen-18 in groundwater and surface waters of the Sochi-Adler artesian basin in Krasnodar Territory was investigated to determine the origin of sulfide waters. According to results of isotopic determinations, sulfide waters of Jurassic deposits are connate sea waters, while waters of Cretaceous deposits are of mixed origin, containing between 64% and 91% freshwater. (Josefson-USGS)
W74-01394

STATE OF RARE EARTH ELEMENTS IN SURFACE WATERS (O SOSTOYANII REDKOZEMEL'NYKH ELEMENTOV V POVERKHNOSTNYKH VODAKH),
Akademiya Nauk SSSR, Moscow. Institut Geokhimii i Analiticheskoi Khimii.
N. S. Zamokina.
Geokhimiya, No 9, p 1141-1146, September 1972. 4 fig, 1 tab, 15 ref.

Descriptors: *Geochemistry, Surface waters, Chemical reactions, *Analytical techniques, Spectrophotometry, Electrophoresis, Solubility, Fulvic acids, Hydrogen ion concentration, Stable isotopes, Radioisotopes, Radioactivity.
Identifiers: *USSR (Moscow River), *Rare earth elements, *Cerium, *Yttrium, *Ytterbium.

Reaction of Ce, Y, Yb, and Ce-144 with fulvic acids separated from highly colored water of the Moscow River was investigated by solubility, spectrophotometric, and electrophoresis techniques. Reaction of rare earth elements with fulvic acids is accompanied by formation of slightly soluble compounds containing a fulvic-acid fraction of high molecular weight and of soluble cationic and anionic complexes containing fulvic-acid fractions of a lower molecular weight. Formation of complex compounds of rare earth elements with fulvic acids and their difference in solubility and stability are examined as possible factors affecting modes of migration, differentiation, and accumulation of rare earth elements in natural processes. (Josefson-USGS)
W74-01395

ISOTOPIC COMPOSITION OF HELIUM IN THERMAL SPRINGS OF ICELAND (IZOTOPNYY SOSTAV GELIYA TERMAL'NYKH ISTOCHNIKOV ISLANDII),
Akademiya Nauk SSSR, Leningrad. Fiziko-Tekhnicheskii Institut.
B. A. Mamyrin, W. N. Bruce, and N. F. Shimp.
Geokhimiya, No 11, p 1396, November 1972. 4 ref.

Descriptors: *Geochemistry, *Isotope studies, *Helium, *Thermal springs, Gases, Volcanoes.
Identifiers: USSR, *Iceland.

A study was made of the isotopic composition of helium from a thermal spring in the northern volcanic rift zone of Iceland. The ratio of He-3:He-4 was 0.0000123 at a helium concentration of 0.0043 percent by volume. The wide ratio of He-3:He-4 for the volcanic zone of Iceland is similar to that obtained for the volcanic zone of the Kurile Islands and Kamchatka and is apparently typical of all volcanic regions on earth. (Josefson-USGS)
W74-01396

FLUOROMETRIC DETERMINATION OF SELENIUM IN WATER WITH 2,3--DIAMINONAPHTHALENE,
New York State Dept. of Health, Albany. Div. of Lab., and Research.
For primary bibliographic entry see Field 05A.
W74-01399

QUANTITATIVE ANALYSIS OF AQUEOUS NITRITE/NITRATE SOLUTIONS BY INFRARED INTERNAL REFLECTANCE SPECTROMETRY,
New York Univ., N.Y. Dept. of Chemistry.
R. T. Yang, and M. J. D. Low.
Available from NTIS, Springfield, Va., 22151, as AD-755 750 for $3.00 paper copy, $1.45 microfiche. Analytical Chemistry, Vol 45, No 12, p 2014-2018, October 1973. 9 fig, 2 tab, 13 ref. (Technical Report No. 4, January 30, 1973. 23 p, 9 fig, 2 tab, 13 ref.).

Descriptors: *Aqueous solutions, *Nitrates, *Nitrites, Chemical analysis, Methodology.
Identifiers: *Qunatitative analysis, *Infrared spectrometry, *Mixtures, Infrared spectra, Chemical concentration, Detection limits, Ammonium nitrite, Ammonium nitrate, Sodium nitrate, Sodium nitrite.

Infrared spectra of aqueous NO2 (-) and NO3 (-) solutions, and of binary mixtures, were recorded using internal reflection techniques and a Fourier transform spectrometer. NO2 (-) could be detected at a concentration of 0.02 M, and NO3 (-) at 0.001 M. However, NO3 (-) also became adsorbed on the Ge prism. After making corrections for NO3 (-) adsorption and for overlapping of NO2 (-) and NO3 (-) bands, it was possible to analyze binary mixtures with concentrations as low as (NO3 (-)) equals 0.03 M and (NO2 (-)) equals 0.05 M. By adjusting the optics so that the usually totally absorbing water stretching band had a transmittance of about 50 percent, it was possible to observe N-H and C-H stretching bands of solutes. Dissolved materials cause the water structure and consequently the water absorption to change, causing distortions of the background of ratioed spectra of aqueous solutions. These distortions may influence qualitative and quantitative observations. (Holoman-Battelle)
W74-01402

SIMPLIFIED SPECTROPHOTOMETRIC ANALYSIS OF PLANTS FOR SELENIUM,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
O. E. Olson.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1073-1077, September 1973. 2 fig, 3 tab, 7 ref.

Descriptors: *Spectrophotometry, *Plant tissues, Feeds, Hay, Grains (Crops).
Identifiers: *Biological samples, *Selenium, *Sample preparation, Detection limits, Recovery, Hair, Reproducibility.

Plant samples can be analyzed for selenium by a simplified spectrophotometric method based on light absorption at 378 nm of the piazselenol formed by the reaction of 2,3-diaminonaphthalene with selenite. Samples of wheat, corn, wheat bran, alfalfa hay, soybean oil meal, linseed oil meal, barley, Astragulus recemosus seeds, and A. bisulcatus leaves and stems were analyzed after digestion. Comparison of results with those obtained by fluorometric analysis, and reproducibility and recovery studies showed the method to be suitable for plant samples containing more than 2 ppm Se. It is also useful for analyzing feed premixes and in diagnosis of selenium poisoning in cattle by hair analysis. (Little-Battelle)
W74-01406

CRITERIA FOR MYCOTOXIN STANDARDS,
Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics.
For primary bibliographic entry see Field 05A.
W74-01414

RELIABILITY OF AN AMMONIA PROBE FOR ELECTROMETRIC DETERMINATION OF TOTAL AMMONIA NITROGEN IN FISH TANKS,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inti.
For primary bibliographic entry see Field 05A.
W74-01433

AN AUTOMATED METHOD FOR THE DERTEMINATION OF TRACE AMOUNTS OF METAL IONS BY ION-EXCHANGE CHROMATOGRAPHY. DETERMINATION OF ZINC (II) IN WATERS,
Government Industrial Research Inst., Nagoya (Japan).
For primary bibliographic entry see Field 05A.
W74-01438

THE DETERMINATION OF ORGANO-SULFUR COMPOUNDS BY THIN-LAYER CHROMATOGRAPHY VIA A LIGAND-EXCHANGE PRECESS,
Dalhousie Univ., Halifax (Nova Scotia). Trace Analysis Research Center.
For primary bibliographic entry see Field 05A.
W74-01439

THE DETERMINATION OF CADMIUM BY ATOMIC ABSORPTION IN AIR, WATER, SEA WATER AND URINE WITH A R.F. CARBON BED ATOMIZER,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01441

THE POTENTIOMETRIC TITRATION OF POTASSIUM IN SEA WATER WITH A VALINOMYCIN ELECTRODE,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 05A.
W74-01442

SMALL-VOLUME SOLID-ELECTRODE FLOW--THROUGH ELECTROCHEMICAL CELLS. PRELIMINARY EVALUATION USING PULSE POLAROGRAPHIC TECHNIQUES,
Hoffmann-La Roche, Inc., Nutley, N.J. Animal Health Research.
For primary bibliographic entry see Field 07B.
W74-01445

SOLUBLE ALUMINUM IN MARINE AND FRESH WATER BY GAS-LIQUID CHROMATOGRAPHY,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05A.
W74-01446

MICROBIAL CULTURE MEDIA PREPARATION,
Western Australian Inst. of Tech., Perth. Dept. of Medical Technology.
For primary bibliographic entry see Field 05A.
W74-01505

ION SELECTIVE SENSORS,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01506

DOUBLE PULSE COULOSTATICS,
Northern Illinois Univ., DeKalb. Dept. of Chemistry.
P. H. Daum.
Analytical Chemistry, Vol 45, No 13, p 2276-2278, November 1973. 2 fig, 1 tab, 20 ref.

Descriptors: *Chemical reactions, *Methodology, Electrochemistry, Resistance, Voltage regulations, Chemical analysis.
Identifiers: *Double pulse coulostatics, *Coulostatic analysis.

A two-step method avoids most problems due to double layer charging and solution resistance and thus allows the study of much faster chemical processes. The method involves the perturbation of the potential of the test electrode from a potential where no electrochemical reaction occurs to the diffusion limiting region with the application of a short duration coulombic pulse. The system is allowed to relax for a predetermined time tau and is then perturbed with a coulombic pulse of opposite sign, to the diffusion limiting region in the other direction. The ratio of the relaxation potential at time 2 tau, to that at time tau is determined, and from this and the value of tau, the rate of a coupled chemical reaction can be determined. The method can be recognized as the addition of a second pulse to the familiar method of coulostatic analysis and is similar to the methods developed by Sluyters et al. for the study of heterogeneous electrochemical processes. (Holoman-Battelle)
W74-01511

GLASS-METAL COMPOSITE ELECTRODES,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
G. G. Guilbault, G. J. Lubrano, and O. N. Gray.
Analytical Chemistry, Vol 45, No 13, p 2255-2258, November 1973. 5 fig, 3 ref.

Descriptors: *Fabrication, *Zeta potential, *Electrical properties, *Electrodes, Instrumentation, Equipment, Construction, Physical properties, Durability, Costs.
Identifiers: Glass-metal composite electrodes, *Sensors, Platinum electrodes, Silver billet electrodes, Potentiometry, Cyclic voltammetry, Potentiometric titration.

Some preliminary data are presented on an electrode system which utilizes a metal/glass composite carried as a film on a rigid inert glass carrier. Such electrodes have the advantages of durability, inertness to poisoners, and low cost. The conventional electrodes used were Beckman 39273 platinum inlay electrodes and Beckman 39261 silver billet electrodes. The new type of sensors was prepared from a chemically pure, low alkali glass cut to sections 1/8-inch thick, 1 inch wide, and 4 inches long. Onto this substrate was screened a formulation composed of a noble metal powder and pure glass binder of low alkali content and of a fine particle size mixed in a fugitive binder. Examples of potentiometric titrations and cyclic voltammetric measurements show the possible usefulness of the new sensors as substitutes for the more costly billet, foil, or wire electrodes now commonly used in potentiometric measurements. (Holoman-Battelle)
W74-01512

ION-ELECTRODE BASED AUTOMATIC GLUCOSE ANALYSIS SYSTEM,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01513

ANALYTICAL APPLICATIONS OF PULSED VOLTAMMETRIC STRIPPING AT THIN FILM MERCURY ELECTRODES,
Colorado State Univ., Fort Collins. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01514

NITROGEN/ARGON RATIOS BY DIFFERENCE THERMAL CONDUCTIVITY,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 05A.
W74-01522

A CHEMICAL SURVEY OF THE MALACCA RIVER,
Kempas Devon Estate, Malacca (Malaysia).
Y. T. Tan, and G. A. Prowse.
Malays Agric J. Vol 48, No 3, p 185-221. 1972, Illus.
Identifiers: Chemical survey, *Malaysia (Malacca River), Minerals, Plankton, Rivers, Saline water, Sewage, Nitrates, Phosphates, Calcium, Sulfates.

A year long chemical survey was carried out over the length of the Malacca river, Malaysia. The tidal gate prevents both saline water and town sewage from passing upstream. Acid gelam swamps lower both the pH and the O2 of the water. Heavy rain washes nutrients downstream, but also lowers the O2 levels. Washing downstream tends to obscure changes in the various ions, although there are indications of the precipitation of Ca as sulphate. During drought nitrite appears to be oxidized to nitrate, while total phosphate levels are higher, probably due to the development of plankton.--Copyright 1973, Biological Abstracts, Inc.
W74-01600

2L. Estuaries

BIOCHEMISTRY OF ESTUARINE ECOSYSTEM WITH EMPHASIS ON HEAVY METALS AND SHELLFISH,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 05C.
W74-01108

HOLBROOK COVE SURVEY--A 1972 STUDENT SUMMER OCEAN ENGINEERING LABORATORY RESEARCH PROJECT.
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 05B.
W74-01131

INVESTIGATIONS ON THE INFLUENCE OF TIDES ON SALINITY, CONTENT OF SUSPENDED MATTER, SEDIMENTATION AND BACTERIA COUNTS IN THE ELBE ESTUARY, (UNTERSUCHUNGEN UBER DIE EINWIRKUNG DER TIDE AUF SALZGEHALT, SCHWEBSTOFFGEHALT, SEDIMENTATION UND BAKTERIENGEHALT IN DER UNTERELBE),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
P. H. Koske, H. Krumm, G. Rheinheimer, and K. H. Szekielda.
Kieler Meeresforschungen, Vol 22, No 1, p 47-63, 1966. 14 fig, 3 tab, 16 ref.

Descriptors: *Estuaries, *Bacteria, Sedimentation, *Tides, *Salinity, *Sediment transport, Suspension, Path of pollutants.
Identifiers: *Elbe estuary (Germany).

The hydrographic conditions in the zone of maximal suspended matter of the Elbe Estuary are described by continous records of transparency, currents, salinity, temperature, and by measurements of the content of particulate C and seston. Investigations on mineralogical composition of suspended matter show no qualitative differences. But there are quantitative differences, obviously influenced by tidal transport sorting effects. With tidal variations of sedimentation and salinity, the distribution and composition of the bacterial flora are changing. (Sinha-OEIS)
W74-01175

SEDIMENTATION IN A MEANDERING ESTUARY,
Lehigh Univ., Bethlehem, Pa. Marine Science Center.
L. S. Land, and J. H. Hoyt.
Sedimentology, Vol 6, No 3, p 191-207, May 1966. 9 fig, 33 ref. NSF-G16426.

Descriptors: *Estuaries, *Sedimentation, Environments, *Coasts, *Georgia, Sand bars, Currents (Water), Sediments.
Identifiers: Bioclastics, Grain size, Point bar deposits.

Sand is being deposited in a meandering estuary separating Sapelo and Blackbeard Islands, Georgia, in the channel of the estuary and on two point bars associated with meanders. Sand is being eroded by the meandering channel from slightly lithified Pleistocene and unconsolidated Holocene strandline deposits, and is being redeposited by the ebb tidal currents. The estuary-channel deposits are coarse grained and their grain-size decreases down ebb current from the source outcrops. The point bars are elongated in the direction of the ebb current, and increase in grain-size from their crests downward as they grade into the channel deposits. Festoon cross-bedding and ripple marks on the point bars record the ebb direction, while elongate plant fragments are preferentially oriented normal to the bar elongation (current). Horizontally stratified muds and muddy sands are being deposited behind the bars, and contain a rich fauna (primarily annelids, arthropods, and molluscs). However, the fauna is represented in the deposits more by burrows and disturbed stratification than by preserved organisms. The sands of the bars and channel are biologically less productive, but the bioclastic content of the sediment is high. (Sinha-OEIS)
W74-01177

ON STRUCTURE, ENTRAINMENT, AND TRANSPORT IN ESTUARINE EMBAYMENTS,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Pacific Oceanographic Group.
J. P. Tully.
Journal of Marine Research, Vol 17, p 523-535, 1958. 4 fig, 14 ref.

Descriptors: *Estuaries, *Salinity, Mixing, *Tides, *Coasts, Entrainment, *Canada.
Identifiers: *Halocine.

When fresh water enters the surface of an embayment it moves persistently seaward. Enroute it entrains seawater from below to form a halocline, in which the salinity increases with depth and to seaward. Wind mixing creates a nearly homogeneous zone in the upper part of the halocline. Below the halocline there is a nearly homogeneous lower zone in which sea water intrudes at a rate sufficient to supply the demand for entrainment. This fresh water transport system is superimposed on the tides which ebb and flood at all depths. There is a surface of no net motion in the halocline above which the net transport is seaward and below which it is inwards. Entrainment is the preferential upward transfer of water from the lower to upper zone. The downward mixing of fresh water is defined by the lower limit of the halocline, which is a surface of unidirectional upward transfer. The zone structure is accurately defined by plotting salinity as a function of the logarithm of depth. The seaward volume transport through the upper zone and halocline, the inward transport through the lower zone, and the upward transfer through the interzone boundary may be computed in terms of the continuity of fresh water, where the rate of input is known. Where it is not known, the equations are solved by introducing the difference of dynamic height across the embayment. The features of structure and transport may be defined by application of normal oceanographic date. Sinha-OEIS)
W74-01178

SOUTH AMERICAN MARINE ENERGY,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 08A.
W74-01181

THE UNION OF THE COLUMBIA RIVER AND THE PACIFIC OCEAN -- GENERAL FEATURES,
Washington Univ., Seattle. Dept. of Oceanography.
A. C. Duxbury.
In: Ocean Science and Ocean Engineering, Transactions 1st Conference Marine Technology Society, Washington, DC, June 1965, Vol 2, p 914-922, 1965. 6 fig. AEC AT (45-1)-1725, ONR Nonr-477 (10), 477 (37).

Descriptors: *Columbia River, *Precipitation (Atmospheric), Freshwater, *Seasonal, Effluent streams, *Winds, Upwelling, *Estuaries, Rivers, Watersheds (Basins), Environments, *Pacific Ocean.

The Columbia River is seasonal in its discharge, having both a winter and a summer peak. The winter peak is generally erratic and a function of the coastal precipitation, while the summer peak, produced by snow melt in the interior, is uniform. The effluent enters the Northeastern Pacific through a belt of near uniform surface coastal water. In this region the Columbia is the largest single contributor of freshwater. During the summer peak discharge period the freshwater added by this one river represents approximately 95% of the area's coastal drainage. However, its influence on the dilution of the oceanic environment is reduced during the winter when other coastal rivers are also at peak flow. In addition to the seasonal variation in river flow, there is a seasonal trend in the transport of the effluent once it has united with the sea. During the winter the prevailing winds hold the effluent close to the shore on the northern side of the river, producing a narrow band of relatively fresh water that is composed of effluent from several coastal sources. The summer brings persistent northerly winds which transport the river's discharge seaward to the southwest and on either side of the river. Since at this time of the year the freshwater in the oceanic environment adjacent to the river is nearly all Columbia River water, any modification of the distributions can be related to the Columbia River and the local transport processes. (Sinha-OEIS)
W74-01183

SEDIMENT TRANSPORT IN A COASTAL PLAIN ESTUARY,
Virginia Inst. of Marine Science, Gloucester Point.
M. Nichols, and G. Poor.
Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 93, No WW4, Proceedings Paper 5571, p 83-95, November 1967. 9 fig, 19 ref.

Descriptors: *Sediment transport, *Estuaries, Density currents, *Tidal effects, *Shoals, Salinity, Diffusion, *Virginia, Turbulence.
Identifiers: *Rappahannock Estuary (Va), Flushing.

Observations of net flow and suspended sediment were made in the Rappahannock Estuary, Virginia, to delineate patterns of transport that lead to partial entrapment of sediment in the middle estuary. The estuary is characteristic of the partly mixed type; its main channel is bordered by extensive submerged shoals. River-borne sediments are flushed downstream through the upper estuary mainly over the shoals. In the middle estuary, sediment is partly entrapped on the north shoals or deposited on the basin floor. Another part is redistributed headward in the channel along with estuarine produced organic constituents. Upstream transport by density currents is augmented by alternating tidal flow that favors differential settling and selective transport of coarse-grained particles. Near the head, rapid advective mixing and moderate tidal turbulence act to deter deposition and recirculate sediment downstream over the shoals. Engineering measures in similar systems should be planned to take advantage of natural self-flushing features. (Sinha-OEIS)
W74-01185

ON THE SMALL-SCALE HORIZONTAL DIFFUSION NEAR THE COAST,
Japan Atomic Energy Research Inst., Tokyo.
For primary bibliographic entry see Field 05B.
W74-01186

LONGSHORE CURRENT VELOCITY: A REVIEW OF THEORY AND DATA,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02E.
W74-01187

TIDAL PERIOD OSCILLATIONS OF AN ISOHALINE SURFACE OFF THE MOUTH OF THE COLUMBIA RIVER,
Washington Univ., Seattle. Dept. of Oceanography.
A. C. Duxbury, and N. B. McGary.
International Journal of Oceanology and Limnology, Vol 1, No 2, p 71-84, April 1967. 6 fig, 1 infold, 5 ref. ONR Nonr 477 (37), AEC AT- (45-1)1725.

Descriptors: *Columbia River, *Salinity, *Tides, Effluent streams, *Coasts, Hydraulics, Currents (Water), Winds, *Estuaries, Water properties.
Identifiers: Tidal periods, *Isohaline surfaces.

Near the mouth of the Columbia River the river effluent forms a surface pool of low salinity water having distinct boundaries. The periodic motion of this pool and the magnitude of the accompanying changes in water characteristics have made it difficult to obtain directly quasi-synoptic measurements. To interpret these changes in both time and space, a repetitive series of observations was made, and depth-time profiles were interpolated for various parameters at selected points within this area of dilution. Vertical oscillations of equiscalar surfaces were found to be correlated with tidal periodicity. The variation in slope of the equiscalar surfaces with time along a three-station line was used in determining the motion of the periphery of the pool of low salinity surface water past the three stations. (Sinha-OEIS)
W74-01188

NOTE ON THE EQUATIONS OF LONG WAVES OVER AN UNEVEN BOTTOM,
National Engineering Science Co., Pasadena, Calif.
For primary bibliographic entry see Field 02E.
W74-01189

LITTORAL ZONE TIDAL-CYCLE SEDIMENTATION,
Brooklyn Coll., N.Y. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-01192

SHORELINE PROCESSES NEAR BARROW, ALASKA: A COMPARISON OF THE NORMAL AND THE CATASTROPHIC,
Tufts Univ., Medford, Mass. Dept. of Geology.
J. D. Hume, and M. Schalk.
Arctic, Vol 20, No 2, p 86-103, June 1967. 9 fig, 25 ref.

Descriptors: *Alaska, *Coasts, *Sediment transport, *Storms, Floods, Climates, Waves (Water), Beaches.
Identifiers: *Point Barrow (Alaska).

Studies of sediment movement between 1948 and 1962 along the Alaska coast west of Point Barrow indicate a normal average yearly net transport to the northeast of 10,000 cubic yards. Net transport east of Point Barrow, based on surveys begun in 1958, indicate a normal annual southeastward movement there of 9,500 cubic yards. On 3 October 1963, a storm with gusts of up to 75 miles per hour blew over an ice-free ocean and attacked the coast. Wave heights, estimated at 10 feet, combined with a storm surge of 11 to 12 feet caused coastal flooding and over $3 million damage. The 1963 storm, probably a 'two-hundred year storm,' moved over 200,000 cubic yards of sediments, which is equivalent to 20 years' normal transport. If the climate is becoming warmer, such storms can be expected more frequently. Construction adjoining the shore should be planned accordingly. (Sinha-OEIS)
W74-01193

A STUDY OF TIDAL DISPERSION IN THE POTOMAC RIVER,
Federal Water Pollution Control Administration, Annapolis, Md. Chesapeake Bay-Susquehanna River Basin Project.
For primary bibliographic entry see Field 05B.
W74-01196

COMPUTER SIMULATION OF ESTUARIAL NETWORKS,
California Univ., Berkeley. Dept. of Civil Engineering.
R. P. Shubinski, J. C. McCarty, and M. R. Lindorf.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 91, No HY5, Proceedings paper 4470, p 33-49, September 1965. 6 fig, 15 ref, 1 append.

Descriptors: *Estuaries, Hydraulics, *Deltas, *California, Water transfer, *Salinity, Diffusion, Water quality, Model studies, Mixing, *Mathematical models, Path of pollutants.
Identifiers: *Sacramento-San Joaquin River (Calif).

The Sacramento-San Joaquin River Delta of California comprises approximately 700 mi of interconnected tidal channels that receive drainage

from the 64,000 sq-mi central valley basin. Waters flowing from the Delta paas through the San Francisco Bay system on their way to the Pacific Ocean. The development of a mathematical model that characterizes the dynamic tidal hydraulic conditions in the Delta network and its application to the prediction of water quality is described. The basic hydraulic conditions of surface water inflow, Delta consumptive uses, export demands, outflow, and tidal action are used as inputs to the model. A high speed digital computer program is described that will treat up to 1000 channel reaches interconnected at up to 750 junctions. Output gives values for input conditions, total head, velocity, surface width, and flow at selected points in both space and time. Other programs make possible salt routing on the basis of net flows and complete mixing. Limitations of this procedure are recognized and plans for the development of a dynamic water quality program are considered. (Sinha-OEIS)
W74-01197

TIDAL CYCLE OF CHANGES IN AN EQUILIBRIUM BEACH, SANDY HOOK, NEW JERSEY,
Columbia Univ., New York.
A. N. Strahler.
Journal of Geology, Vol 74, No 3, p 247-268, May 1966. 14 fig. ONR Nonr 266 68.

Descriptors: *New Jersey, *Beaches, *Coasts, *Sedimentation, Profiles.
Identifiers: *Tidal cycles, Sandy Hook (NJ).

The purpose of the field study described was to determine the characteristic summer equilibrium profile form and composition of the Atlantic Ocean beach of Sandy Hook, New Jersey, and to determine in detail the minor cyclic fluctuations in profile and sediment compositon imposed by the semidiurnal tidal cycle. Reference grids were laid out on the beach at two field stations to provide horizontal and vertical control for profile lines surveyed transverse to the shoreline in the foreshore zone. Surveys carried out during the summers of 1959, 1960, and 1961 provided data on the characteristic form and evolution of the beach during the summer regime of low waves and persistent obliquity of wave approach from the southeast. A series of half-hourly profile surveys permitted documentation of the small changes of beach form accompanying the rise and fall of tide and led to the formulation of a schematic model for the sequences of erosion and deposition in a semidiurnal tidal cycle. (Sinha-OEIS)
W74-01198

EXPERIMENTS AND HYDROGRAPHIC SURVEYS OFF SANDY HOOK, NEW JERSEY (1963),
Lamont-Doherty Geological Observatory, Palisades, N.Y.
T. Ichiye.
Technical Report No. CU-266 (48)-11 and Technical Report No. CU-2663-18, July 1965. 29 p, 9 fig, 15 ref, 1 append. ONR Nonr 266 (48), AEC AT (30-1) 2663.

Descriptors: *New Jersey, *Dye concentrations, *Diffusion, Weather, Bays, Advection, *Hydrography, *Coasts, Turbulence, Energy.
Identifiers: *Sandy Hook (NJ).

Dye diffusion experiments carried out off Sandy Hook, New Jersey on August 7 and October 15 through 18 in 1963 are described. Aerial photographs from a low flying airplane in October experiments showed fine structures of dye patches, such as striations, owing to calm weather. A shipborne fluorometer indicated that dye was thinly spread vertically only above seven meters in October although thermocline was located at about 25 meters. Hydrographic data off Sandy Hook Bay were collected at three different tidal stages on August 6 to 7. These data indicate that advection of water in the bay by tidal currents occurred independently at each level without much vertical mixing. Relationships between spectrum of mean square deviations of concentration and that of turbulent energy are discussed in relation to the dye diffusion process. (Sinha-OEIS)
W74-01199

HARBOR ANALOG SYSTEM, PART I - WAVES,
Navy Hydrographic Office, Washington, D.C. Oceanographic Analysis Div.
A. L. Grabham.
Technical Report TR-117, August 1961. 33 p, 14 fig, 1 tab, 29 ref, 1 append.

Descriptors: *Harbors, *Waves (Water), Winds, Fetch, Seasonal, *Shallow water, *Estuaries.

An initial attempt is presented to classify harbors and nearshore areas into analogous groups with respect to the frequency distribution of wave heights and wave periods. The harbors and nearshore areas of the world are classified according to the wind regime, the maximum fetch length, and the prevailing wind direction in the primary fetch area with respect to the shoreline. Additional breakdowns provide for seasonal variations and varying degrees of sheltering. Wave height and period cumulative frequency distribution graphs have been compiled for each possible combination under the classification system. The graphs have been assembled from data averaged from studies of the U.S. Navy Hydrographic Office, and U.S. Beach Erosion Board, and from compilations of wave data tabulated from oceanographic decks of the National Weather Records Center of the U.S. Weather Bureau. Examples of the use of the graphs are provided as well as a brief description of other factors which affect waves in shallow water. (Sinha - OEIS)
W74-01200

THE INFLUENCE OF TOPOGRAPHY AND PRESSURE GRADIENTS ON SHOALING IN A TIDAL ESTUARY,
Leeds Univ. (England). Dept. of Mechanical Engineering.
R. C. McGregor.
Geophysical Journal of the Royal Astronomical Society, Vol 25, No 5, p 469-480, December 1971. 4 fig, 1 tab, 11 ref.

Descriptors: *Estuaries, Tides, Equations, *River flow, Density currents, Topography, *Sedimentation, *Coasts.
Identifiers: *Shoaling, *Pressure gradients.

The non-periodic equations governing tidal motion in estuaries are developed. These equations, which determine the density driven currents within the estuary are then demonstrated to be easily soluble for estuaries of arbitrary topography, river flow and density distribution. The solution relates all the principal parameters associated with estuarial flow to the location of the deposition zone and can also be used to demonstrate the importance of different agencies in particular estuaries. The evaluation of the solution is very economical on computing time and requires only readily available data. Results are discussed with respect to data appropriate to the River Thames and the River Humber and agreement with observation is very good. (Sinha-OEIS)
W74-01204

ON THE VERTICAL STRUCTURE OF TIDAL FLOW IN RIVER ESTUARIES,
Reading Univ. (England). Dept. of Mathematics.
B. Johns, and N. Odd.
Geophysical Journal of the Royal Astronomical Society, Vol 12, No 5, p 103-110, November 1966. 1 fig, 1 tab, 6 ref, 1 append.

Descriptors: *Estuaries, *Tidal effects, *Rivers, *Currents (Water), Turbulence, Shear stress, Coasts.
Identifiers: Humber River (U.K.), Shoaling, Eddy viscosity.

A technique is developed for calculating the distribution with depth of current and shearing stress in tidal estuaries. The effect of turbulence is introduced by a coefficient of eddy viscosity which is a prescribed function of the depth coordinate, and the predictions are compared with observation and existing theory. Using parameters representative of the Humber estuary, the resultant current profiles are found to be in reasonable agreement with recent measurements. The friction coefficient k (used in the Lorentz linearization of the quadratic friction law) has a value consistent with that determined by the other methods. (Sinha-OEIS)
W74-01205

THE EQUATIONS OF CONTINUITY FOR SEA-WATER AND RIVER WATER IN ESTUARIES,
Scripps Institution of Oceanography, La Jolla, Calif.
R. S. Arthur.
Journal of Marine Research, Vol 22, No 2, p 197-202, May 1964. 7 ref.

Descriptors: *Estuaries, *Mixing, *Diffusion, Sea water, Freshwater, Salinity.
Identifiers: Turbulent diffusion, Conservation equations.

Conservation equations for a mixture of fluids with two components are reviewed. Equations of continuity for sea (salt) water and for river (fresh) water in a turbulent mixing process in an estuary are developed. One source of error in certain similar equations in the literature is the omission of the turbulent diffusion flux. (Sinha-OEIS)
W74-01207

THE GENERATION OF LONGSHORE CURRENTS ON A PLANE BEACH,
Liverpool Observatory and Tidal Inst., Birkenhead (England).
A. J. Bowen.
Journal of Marine Research, Vol 27, No 2, p 206-215, May 1969. 2 fig, 10 ref. NO0014-69-A-0200-6006.

Descriptors: *Beaches, Momentum transfer, Surf, *Model studies, Shallow water, *Currents (Water), *Waves (Water).
Identifiers: *Longshore currents, Velocity field, Radiation stress.

The generation of longshore currents on a beach is investigated theoretically, using the concept of radiation stress to describe the flux of momentum associated with the incoming waves. Outside the surf zone, the longshore gradient of the radiation stress is always zero, and the flow is therefore driven only inside the surf zone. The exact form of the longshore current is dependent on assumptions about both the behavior of the waves in the surf zone and the form of the viscous forces. However, with reasonable assumptions, the theory leads to a complete description of the velocity field as a function of the distance from the shore. The model is intended to provide a mathematical framework in which the various possible assumptions can be tested by comparing them with reliable experimental data. One of the laboratory experiments of Galvin and Eagleson (1965) is used to show the relevance of this approach. (Sinha-OEIS)
W74-01208

THE CIRCULATION OF SURFACE WATERS IN RALEIGH BAY, NORTH CAROLINA,
Duke Univ., Durham, N.C. Dept. of Zoology; and Duke Univ., Beaufort, N.C. Marine Lab.
I. E. Gray, and M. J. Cerame-Vivas.

Limnology and Oceanography, Vol 8, No 3, p 330-337, July 1963. 5 fig, 2 tab, 13 ref. NSF G-13,952 and G-25,128.

Descriptors: *North Carolina, *Surface waters, *Coasts, *Bays, Winds, Currents (Water), Water circulation, Topography, Drift bottles.
Identifiers: *Raleigh Bay (N.C.).

Returns from helicopter-released drift bottles over Diamond Shoals, in April and August 1962, revealed a definite southwesterly coastal flow from Cape Hatteras, North Carolina. Influenced by northeast winds the flow was more pronounced in late summer than in late spring, some of the bottles rounding Cape Lookout. Recovery of drift bottles from Onslow Bay and Bogue Sound strongly supports the theory that the temporary winter populations of distinctly northern species in the Beaufort, North Carolina, area become established from planktonic larvae that originated north of Cape Hatteras and were transported around the capes. A postulated circulation, involving the influences of Diamond and Lookout shoals, runoff, northeasterly and southwesterly winds, and back eddies from the Florida Current and from wind-induced currents, is presented for Raleigh Bay. (Sinha-OEIS)
W74-01210

TIDEWATER SHORELINES IN BROWARD AND PALM BEACH COUNTIES, FLORIDA: AN ANALYSIS OF CHARACTERISTICS AND CHANGES INTERPRETED FROM COLOR, COLOR INFRARED AND THERMAL AERIAL IMAGERY,
Florida Atlantic Univ., Boca Raton. Remote Sensing and Interpretation Lab.
L. A. Eyre.
Available from NTIS as AD-727 630, Paper copy $3.00, Microfiche $1.45. Technical Report No 11, June 1971. 28 p, 17 fig, 1 tab. NO00-14-67-A-0320-0003.

Descriptors: Coasts, *Shores, *Tidal waters, Color, *Aerial photography, *Remote sensing, *Florida.
Identifiers: Broward County (Fla), Palm Beach County (Fla), Infrared, Thermal aerial imagery, Imagery pattern analysis.

In South Florida, pressures to extend and modify tidewater shorelines are very strong. These modifications include canal excavations, dredging and filling, bulkheading, erection of sea walls, and dock construction. Access to tidewater is much coveted and competition for such access is keen. Using color infrared aerial photography flown at 5000 ft., eight types of tidal shorelines are distinguished in a portion of NASA Test Site 164. Comparisons are made with other imagery, including high-altitude (60,000 ft.) photography and that from the Reconafax and Bendix Thermal Infrared sensor systems; and the degree to which these shoreline types are observable is noted. Some changes over time are also indicated, in particular the extent of additional modifications during a period of approximately one year. (Sinha-OEIS)
W74-01220

ESTUARINE CIRCULATION INDUCED BY DIFFUSION,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
D. V. Hansen, and M. Rattray, Jr.
Journal of Marine Research, Vol 30, No 3, p 281-294, September 15, 1972. 6 fig, 1 tab, 11 ref.

Descriptors: *Estuaries, *Stratification, *Diffusion, Salinity, *Chesapeake Bay, *Water circulation, Momentum transfer, *Maryland.
Identifiers: *Baltimore Harbor (Md), Flushing, Bottom friction, Turbulent exchange.

Similarity solutions of the equations for estuarine circulation and salt balance are presented for a circulation generated by diffusive modification of stratification maintained at the entrance to an inlet by external dynamics rather than by fresh water discharged directly into the inlet. The explicit x dependence may be factored from the governing equations if the inlet geometry and longitudinal variation in turbulent exchange coefficients are expressible as power or exponential functions of distance along the inlet, and the ordinary differential equations so obtained are solved approximately by perturbation in a function of the Rayleigh number. Salinity in the model decreases inward along the bottom but increases inward along the surface of the inlet, and the flow is three-layered - inward at the top and bottom, outward at the mid-depth - as have been shown and inferred for Baltimore Harbor. Inclusion of bottom friction increases the salinity gradient along the bottom and decreases it along the surface, giving the salinity distribution some resemblance to that expected in conventional estuaries. The induced circulation in all cases is a strong function of total depth and a weaker function of length and turbulent exchange coefficients for salt and momentum. The model can serve as an aid to interpretation of observations in this type of estuary, and it provides a simple means of evaluating the circulation and mixing rates from salinity measurements to whatever precision the eddy vicosity can be estimated, or current measurement can be obtained to scale the flow. (Sinha-OEIS)
W74-01222

THE EFFECT OF MICROBIAL ACTIVITY UPON THE SEDIMENTARY SULPHUR CYCLE,
University of the South Pacific, Suva (Fiji).
For primary bibliographic entry see Field 05B.
W74-01239

ZOOBENTHOS OF THE AZOV SEA AFTER THE CONTROL OF THE DON RIVER, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
M. Ya. Nekrasova.
Zool Zh. Vol 51, No 6, p 789-797. 1972, Illus, (English summary).
Identifiers: *Benthos biomass, Biocenosis, Don River (USSR), Fauna, Food, Marine fauna, Nitrogen, Phosphorus, River control, *USSR (Azov Sea), *Zoo benthos.

After control of the Don River (USSR) flow, the amount of zoobenthic biocenoses in the Taganrog Bay diminished from 10 to 5. The benthos biomass in the western and central regions increased 2-3 times at the expense of introduction of marine fauna in the bay. In the eastern region, the biomass decreased by 40% at the expense of relict fauna. Two periods can be distinguished in the development of benthos in the Azov Sea after the control of flow. The first period (1952-1955) was characterized by ground compaction and the complete absence of suffocations, development of epifauna and depression of infauna on the background of unstable river regime. The Benthos biomass amounted to 210 g/m2 with 57% of food benthos. During the second period (1956-1970) the hydrological river regime stabilized and the concentration of N and P compounds markedly increased. The total benthos biomass amounted to 273 g/m2 with 70% of food benthos. The production of food zoobenthos in the Taganrog Bay varied in different yr from 243-644 thousand tons and in the Azov Sea from 19-196 million tons.--Copyright 1973, Biological Abstracts, Inc.
W74-01257

RELATIONSHIPS BETWEEN TURBIDITY AND HYDROGRAPHICAL FACTORS IN FRESH AND BRACKISH WATER REGION OF THE ELBE ESTUARY, (IN GERMAN),
For primary bibliographic entry see Field 05B.
W74-01260

'TRAPPED SEA-WATER' IN RORHOLTFJORDEN,
Oslo Univ. (Norway). Dept. of Limnology.
For primary bibliographic entry see Field 02K.
W74-01263

SEDIMENT TRANSPORT: NEW APPROACH AND ANALYSIS,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 02J.
W74-01279

OCEAN UTILIZATION AND COASTAL ZONE DEVELOPMENT.
Massachusetts Inst. of Tech., Cambridge.

Available from NTIS, Springfield, Va., 22151 as COM73-10417, Price $3.00 printed copy; $1.45 microfiche. Sea Grant Report No 73-3, 1973. 27 p. Sea Grant GH-88.

Descriptors: *Oceanography, *Estuaries, *Harbors, *Grants, *Water resources, Research Act, Colleges, Training, Projects, Navigation, Oil spills, Water pollution sources, Marine biology, Marine bacteria, Environmental control.

The Massachusetts Institute of Technology established its Institute-wide Sea Grant Program in July 1970 to execute the Coherent Area Project (CAP), 'Ocean Utilization and Coastal Zone Development,' using Grant Number GH-88 from the Office of Sea Grant, National Oceanic and Atmospheric Administration. OSG extended this grant for one year to June 30, 1972, at no additional cost to the grant. This extension means that additional studies and data are included in this report and complete, rather than interim, reports are provided on three of the first-year projects: research projects, education and training projects, and advisory services projects. The major emphasis for the 1970-71 program year was to organize an effective operation and to direct a viable program that emphasized the education and training and the research categories. These, with the advisory services, are explicit requirements of mature Sea Grant programs. Advisory service efforts included establishing a Marine Resources Reference Center, publishing and distributing reports, and organizing and implementing symposia and seminar meetings. (Woodard-USGS)
W74-01281

WAVE-INDUCED WATER PARTICLE MOTION MEASUREMENTS,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02E.
W74-01285

OXNARD BASIN EXPERIMENTAL EXTRACTION-TYPE BARRIER,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 08B.
W74-01289

INVENTORY AND EVALUATION OF INFORMATION ON DELAWARE BAY, VOLUME 2.
Natural and Historic Resource Associates, Philadelphia, Pa.
For primary bibliographic entry see Field 06E.
W74-01369

OBSERVATIONS OF NET SHORELINE POSITIONS AND APPROXIMATIONS OF BARRIER ISLAND SEDIMENT BUDGETS,
Skidaway Inst. of Oceanography, Savannah, Ga.
G. F. Oertel.

Available from NTIS, Springfield, Va 22151, COM-73m10692 Price $3.00 printed copy; $1.45 microfiche. Georgia Marine Science Center Technical Report Series No 73-2, February 1973. 23 p, 6 fig, 3 ref.

Descriptors: *Sediment transport, *Barrier islands, *Coasts, *Georgia, Investigations, Aerial photography, Beaches, Littoral drift, Data collections, Evaluation, Beach erosion, Shore protection, Erosion control, Ocean currents, Tidal effects, Waves (Water).
Identifiers: Shoreline changes (Georgia).

A short term history (30 years) of the barrier-island shoreline positions in Georgia was studied using aerial photographs. Distances of shoreline erosion and accretion were measured from transects established on sets of aerial photographs of barrier-island shorelines. Four sets of aerial photos were used in this part of the study. A 1933 set of aerial photos obtained from the Department of Commerce was used to establish transects on St. Catherines and Sapelo Island. The other barrier islands were not in this set. Complete sets for 1942, 1952 and 1965 were obtained from the Corps of Engineers, the Department of Agriculture, and the U.S. Coast Geodetic Survey. Although vertical photos for the 1970's were not available, oblique photos were taken from a small plane in March of 1972, and some geomorphic changes between the 1960's and 1970's were noted. The most obvious conclusion was that over a given interval of time there were no general trends that applied to the sediment budgets (net shoreline positions) of all barrier islands. Barriers and portions of barriers appeared to be undergoing sequential sedimentary and morphologic changes. (Woodard-USGS)
W74-01372

PHYSIOLOGICAL ECOLOGY OF GELIDIELLA ACEROSA (FORSSKAL) FELDMANN ET HAMEL,
Saurashtra Univ., Rajkot, (India). Dept. of Biosciences.
For primary bibliographic entry see Field 05C.
W74-01424

DIATOM ASSOCIATIONS IN YAQUINA ESTUARY, OREGON : A MULTIVARIATE ANALYSIS,
Oregon State Univ., Corvallis. Dept. of Botany.
For primary bibliographic entry see Field 05B.
W74-01430

GROWTH RATES OF INTERTIDAL MOLLUSCS AS INDICATORS OF EFFECTS OF UNEXPECTED INCIDENTS OF POLLUTION,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 05C.
W74-01434

PROBABLE CAUSES FOR THE 1972 RED TIDE IN THE CAPE ANN REGION OF THE GULF OF MAINE,
New Hampshire Univ., Durham. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-01435

VIRGINIA NATURAL RESOURCES LAW AND THE NEW VIRGINIA WETLANDS ACT,
D. J. Brion.
Washington and Lee Law Review, Vol 30, No 1, p 19-71, Spring 1973. 202 ref.

Descriptors: *Legislation, *Virginia, *Wetlands, Legal aspects, Coastal marshes, Local governments, Tidal marshes, Swamps, Constitutional law, Aquatic habitats, Bodies of water, Land reclamation, Governmental interrelations, Water resources development.

When the Virginia General Assembly enacted a wetlands protection statue at its 1972 Session, Virginia became one of the last east coast states to enact laws protecting its valuable wetlands resources. Unlike other states, Virginia chose to place the primary authority and initiative for wetlands protection not in a state-level agency created for that purpose, but in its cities, counties, and towns. The act enables each Virginia locality containing defined wetlands to set up a local wetlands zoning board whose duty is to pass on all uses, with limited exceptions, of local wetlands. Although local board decisions are reviewable by a central state marine resources agency and by the courts, the thrust of the act is to place the initiative for wetlands protection on the Virginia localities. The practical success of this act is yet to be demonstrated, but by its innovative structure it should be more successful than some of th
W74-01448

PARTICULATE METALS IN WATERS OF SORFJORD WEST NORWAY,
Edinburgh Univ. (Scotland). Grant Inst. of Geology.
For primary bibliographic entry see Field 05B.
W74-01528

BOTTOM FAUNA AS AN INDICATOR OF WATER QUALITY IN SWEDEN'S LARGE LAKES (LAKES MALAREN, VATTERN AND VANERN),
Uppsala Univ. (Sweden). Inst. of Zoology.
For primary bibliographic entry see Field 05B.
W74-01531

THE RELATIONS OF PERIPHYTIC AND PLANKTONIC ALGAL GROWTH IN AN ESTUARY TO HYDROGRAPHIC FACTORS,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W74-01571

THE MANAGEMENT OF BAY AND ESTUARINE SYSTEMS IN THE TEXAS COASTAL ZONE, PHASE II.
Texas Univ., Austin. Div. of Natural Resources and the Environment.
For primary bibliographic entry see Field 05G.
W74-01620

VALUATION OF VISUAL-CULTURAL BENEFITS FROM FRESHWATER WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 06B.
W74-01643

SOME CONSEQUENCES OF AN INERTIA OF TURBULENCE IN A TIDAL ESTUARY,
Reading Univ. (England). Dept. of Geophysics.
B. Johns.
Geophysical Journal of the Royal Astronomical Society, Vol 18, No 1, p 65-72, September 1969. 3 fig, 6 ref.

Descriptors: *Estuaries, *Turbulence, Circulation, Energy dissipation, Tides, *Tidal effects.
Identifiers: *Reynolds stress, Vertical gradient, Phase difference, Estuarine processes.

The changes that occur in an idealized estuary are considered in: the vertical structure of the tidal flow; the total mean rate of energy dissipation; and the tidal elevation at the head of the estuary. Having isolated the effect of a phase difference in a simple idealized estuary, the same conclusions may be expected to apply in a more general estuarial topography. A parametric representation of the turbulence in a tidal estuary is considered in which there is a specified phase difference between the Reynolds stress and vertical gradient of the tidal current. The model is used to estimate the dependence of the vertical and horizontal tidal structure on this phase difference. Calculations are also performed to determine changes in the mean rate of energy dissipation in the estuary. (Sinha-OEIS)
W74-01648

OSCILLATIONS OF TIDE AND SURGE IN AN ESTUARY OF FINITE LENGTH,
J. Proudman.
Journal of Fluid Mechanics, Vol 2, No 4, p 371-382, June 1957. 3 ref.

Descriptors: *Estuaries, *Tides, *Surges, Meteorology, *Tidal effects, Mathematics, *Coasts.
Identifiers: Surface elevation.

This paper is concerned with a narrow basin of uniform cross-section open to the sea at one end and closed at the other. An incident long wave of prescribed general form is supposed to enter from the sea and to represent the combination of tide and surge as generated in the sea. The solution of the linear terms of the equations of continuity and motion gives the reflection of this wave at the head of the estuary. The next approximation is given when the non-linear terms are retained, the second-order motion being made determinate by the condition that, at the mouth, it reduces to a progression towards the sea. The chief results relate to the surface elevation at the head of the estuary. When the first order elevation there increases steadily to a maximum, the effect of the 'shallow water terms' is to make high water higher and earlier, while the effect of the 'frictional term' is to make high water lower and later. For a short estuary, the interaction of the tide on a surge, due to a given sequence of meteorological conditions over the sea, is to make it higher when its maximum occurs at the time of tidal high water than when its maximum occurs at the time of tidal low water. This is directly opposite to the corresponding result when the estuary is of infinite length. (Sinha - OEIS)
W74-01649

LONGSHORE CURRENT GENERATION BY OBLIQUELY INCIDENT INTERNAL WAVES,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 02E.
W74-01650

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3B. Water Yield Improvement

POTENTIAL USEFULNESS OF ANTITRANSPIRANTS FOR SOLUTION OF SOME WATER SUPPLY, PLANT GROWTH, AND ENVIRONMENTAL PROBLEMS,
California Univ., Davis. Dept. of Water Science and Engineering.
R. M. Hagan, and D. C. Davenport.
Available from the National Technical Information Service as PB-225 292/2, $3.50 in paper copy, $1.45 in microfiche. California Water Resources Center, Davis, Project Technical Completion Report (1970-1973), September 30, 1973. 60 p, 8 plates, 16 tab. OWRR A-035-CAL (1). 14-31-0001-3505.

Descriptors: *Transpiration control, *Evapotranspiration control, Chemcontrol, Stomata, Water conservation, *Antitranspirants, Water supply, *Photosynthesis, *Phreatophytes, Fruit crops.

Effects of film-forming antitranspirants on rates of transpiration and photosynthesis were evaluated by leaf chamber studies using dew-point hygrometer and infrared gas analyzer to monitor water vapor and carbon dioxide content of the air stream. Promising antitranspirant materials were evaluated as to foliar coverage with the aid of a scanning electron microscope, evaluated as to techniques of application, influence of stomatal conditions, plant-water potential and transmission of photosynthetically active wave lengths of light. Various antitranspirants were also field tested for possible use in highway landscaping, extension of life of cut flowers, aid in survival of transplants and cuttings, and improvement in fruit quality. Possible use of antitranspirants in reducing water loss by phreatophytes without destroying vegetation and ecological balance were also considered. (Snyder-California)
W74-01105

DEVELOPMENT OF A TIME-SPACE PREDICTION TECHNIQUE TO EVALUATE SNOWPACKS IN AND ADJACENT TO FOREST OPENINGS,
Arizona Univ., Tucson. Dept. of Watershed Management.
P. F. Ffolliott.
Project Completion Report, October 1973. 3 p. OWRR A-037-ARIZ (1). 14-31-0001-3803.

Descriptors: *Snowmelt, Runoff, Water supply, Forests, *Snow packs, *Arizona, Water sources, Water yield improvement.
Identifiers: New water supply, *Forest management guidelines, *Forest openings, Time-space prediction techniques.

In Arizona, snowpack water yield provides a major source of water for the reservoir systems, and it also contributes to the recharge of ground water aquifers. Much of the water realized is derived from the forest zone, which suggests the use of forest management practices (i.e., creating openings of different sizes, shapes, and orientations in forest overstories) in water yield improvement programs. Source information was obtained to develop a time-space prediction technique for evaluating and quantifying snowpack conditions in and adjacent to forest openings in terms of whether an increase in water equivalent occurred. And, if an increase was observed, the physical trade-off between the increased water equivalent and the decreased forest overstory was defined. This information is prerequisite to the synthesis and evaluation of water yield improvement programs based on forest management practices.
W74-01231

GEOTHERMAL RESOURCE INVESTIGATIONS,
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 04B.
W74-01273

ICEBERGS AS A FRESH-WATER SOURCE: AN APPRAISAL,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 02C.
W74-01375

SIMULATION MODELS FOR WATER--RESOURCE SYSTEMS: THEIR UTILITY IN MEASURING PHYSICAL AND ECONOMIC EFFECTS OF WEATHER FORECASTING AND WEATHER MODIFICATION: SUMMARY REPORT,
North Carolina Univ., Chapel Hill.
M. M. Hufschmidt, M. B. Fiering, and J. K. Sherwani.
In: Human Dimensions of the Atmosphere, Pt. 3, NSF 68-18, GPO, Washington, D.C., p 121-135, February, 1968.

Descriptors: *Water resources, Methodology, *Simulation analysis, *Weather modification, *Weather forecasting, Model studies.
Identifiers: Harvard Water Resources Program, Physical effects, Economic effects.

The feasibility of adapting water-resource system simulation techniques as a means for testing the physical and economic effects of weather management and forecasting on controlled water-resource systems is examined. Simulating behavior proceeds by: (1) assigning initial trial values to the decision variables; (2) operating the selected system over a selected period of time using the exogenous variables; and (3) observing the physical and economic response of the selected system. In order to adapt such a program to handle weather modification and forecasting situations changes would be needed with respect to: (1) exogenous data: essentially the historic precipitation and climatologic records; (2) synthetic precipitation generator, using historic precipitation records as inputs; (3) new exogenous data: information on the nature of modifications of precipitation; (4) precipitation-runoff model, translating precipitation data into runoff data; (5) streamflow-forecast model; (6) revised operating policy model, adapted to handle streamflow; (7) revised-economic evaluation sub-model, adapted to handle deficits under conditions of natural and modified precipitation, and conditions of streamflow forecasting and absence of forecasting. The necery subroutines are discussed, and it is concluded that it appears feasible to adapt water-resources system simulation programs of the Lehigh-Delaware type for use in testing the effectiveness of weather modification and streamflow forecasting measures. Additional research recommendations are suggested. (Edwards-North Carolina)
W74-01463

UNDERGROUND STORAGE OF TEXAS PLAYA LAKE WATERS BY INJECTION INTO THE OGALLALA FORMATION UNDER MODERATE PUMP PRESSURE,
Texas Tech Univ., Lubbock.
For primary bibliographic entry see Field 04B.
W74-01627

3C. Use of Water of Impaired Quality

THE ACTION OF MINERAL FERTILIZATION ON PASTURE HERBAGE, IRRIGATED WITH SEWAGE, (IN RUSSIAN),
Moskovskaya Selskokhozyaistvennaya Akademiya (USSR).
For primary bibliographic entry see Field 05D.
W74-01559

IRRIGATION WATERS OF THE INDUS PLAINS AND THEIR SALT LOAD,
Irrigation Research Council, Islamabad (Pakistan).
S. B. Hasan, and M. A. Hafeez Khan.
In: Cento Seminar on Agricultural Aspects of Arid and Semi-arid Zones, September 19-23, 1971, Tehran, Iran, Central Treaty Organization, p 278-295. 7 tab.

Descriptors: Hydrologic data, Water levels, *Salts, Consumptive use, Water quality, Water resources, Groundwater basins, Seepage, Percolation, Saline water-freshwater interfaces, Arid lands, Irrigation effects, Soil water movement, *Salinity, *Irrigation water, Saline water, *Saline soils.
Identifiers: *West Pakistan (Indus Basin).

West Pakistan covers a land area of about 311,000 sq. mi. Summer temperatures are high, exceeding 120 F in the upper Sind. This region is divided into three distict hydrological units: the Indus Basin, the basin of the Kaharan Desert, and the Markran coastal streams discharging directly into the Arabian Sea. The river waters used for irrigation in the Indus Plains are of high quality with a salt content of only 200-300 ppm. The quality of groundwater is variable, having three separate zones: the fresh water zone--less than 1,000 ppm total disolved salts (TDS); the marginal zone--1,000 to 2,000 ppm TDS; and the unusable saline zone--2,00 ppm TDS and over. Waterin the marginal zone can be used by mixing it with canal water. Seepage from the existing irrigation systems has built up a huge groundwater reservoir in the Indus Plains, and over the past 100 years the water table has been stedily rising. An appreciable upward movement of subsoil water by capillary action has resulted in considerable salt deposition through evaporation of soil water at the surface. Supplemental irrigation water is now required to depress the accumulated salts in addition to the consumptive use requrements of crops. Also, it is now necessary to raise the intensity of croppping in order to reduce evaporation from the soil surface and resultant salt build up. (Black-Arizona)
W74-01639

3D. Conservation in Domestic and Municipal Use

RECREATIONAL REUSE OF MUNICIPAL WASTEWATER,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 05D.
W74-01103

URBANIZATION AND ITS EFFECTS ON REGIMEN AND QUALITY OF SURFACE WATERS (URBANIZATSIYA I YEYE VLIYANIYE NA REZHIM I KACHESTVO POVERKHNOSTNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 04C.
W74-01139

ENGINEER'S REPORT FOR SOUTH VALLEY WATER SYSTEM.
Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.
For primary bibliographic entry see Field 06B.
W74-01382

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH,
For primary bibliographic entry see Field 04A.
W74-01452

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM.
LBC and W Associates, Columbia, S.C.
For primary bibliographic entry see Field 05D.
W74-01469

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CONTROLS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 05D.
W74-01470

RELATING COMPREHENSIVE SEWER AND WATER PLANS TO THE COUNTY LAND USE PLAN. GOALS, POLICIES AND STANDARDS.
Chenango County Planning Board, Norwich, N.Y.

For primary bibliographic entry see Field 05D.
W74-01473

COMPREHENSIVE WATER AND SEWER PLAN, RANDOLPH COUNTY, ILLINOIS.
Southwestern Illinois Metropolitan Area Planning Commission, Collinsville.
For primary bibliographic entry see Field 05D.
W74-01474

STORM DRAINAGE AND FLOOD CONTROL FOR METROPOLITAN DENVER.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 04A.
W74-01475

TRI-AGENCIES PIPELINE: ENGINEERING REPORT.
San Diego County Water Authority, Calif.
For primary bibliographic entry see Field 08A.
W74-01477

REVIEW OF PLANNING FOR THE GRAND RIVER WATERSHED.
For primary bibliographic entry see Field 05D.
W74-01478

WATER MASTER PLAN. EUGENE-SPRINGFIELD URBANIZING AREA.
Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Oreg.

Prepared for Lane Council of Governments, Eugene, Oregon. December, 1970. 114 p, 60 fig, 38 tab, 23 ref, 3 append. ORE. P-116.

Descriptors: *Water supply development, *Planning, *Regional development, Costs, Project planning, *Oregon, Treatment facilities.
Identifiers: *Water system expansion, *Eugene-Springfield (Ore).

Population projections and commercial and industrial land use forecasts were used in conjunction with water use demands and related demand variations to determine future system requirements for both short-range (1975) needs and the long-range (1990) program. Projections were applied separately to the two elements within the study area: the central study area, including Eugene and Springfield; and the outlying communities. Because slow growth projections indicated that local demands of the outlying communities could be met (until 1990) by expansion of present systems, system development plans were concentrated on the central study area. Three alternative plans were evaluated for the central study area: (1) expansion of each of the present 9 utilities, (2) consolidation of utilities in the Springfield area, resulting in 2 area-wide utilities, and (3) the combination of all utilities into a single regional system. The third alternative was recommended. It offered the least capital cost, least cost in terms of construction programming (based on present worth analyses), and the least operation and maintenance expense. Besides interconnecting the existing system, the plan included the expansion of major water supply sources, particularly the Delta Treatment Plant, the installation of additional storage and pumping plants by the Airport and Willakenzie Reservoirs, and the construction of transmission and primary distribution mains. (Hoffman-North Carolina)
W74-01479

UTILITY PROVISIONS ANALYSIS FOR EAST CENTRAL FLORIDA.
Reynolds, Smith and Hills, Jacksonville, Fla.
For primary bibliographic entry see Field 06D.
W74-01480

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING REGION.
Aase (George) and Associates, Inc., Tallahassee, Fla.
For primary bibliographic entry see Field 06D.
W74-01481

REPORT ON LAUREL CREEK CHANNEL IMPROVEMENTS, WATERLOO AND BRIDGEPORT, ONTARIO.
Kilbom Engineering Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 04A.
W74-01482

FLOODLAND AND SHORELAND DEVELOPMENT GUIDE.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04A.
W74-01483

A GROWING COMMUNITY: 1973 UPDATE, (LEXINGTON, KENTUCKY).
Lexington and Fayette County Planning Commission, Lexington, Ky.
For primary bibliographic entry see Field 05D.
W74-01484

SKETCH DEVELOPMENT PLAN, CHAMBERS COUNTY, ALABAMA.
East Alabama Regional Planning and Development Commission, Anniston.
For primary bibliographic entry see Field 05D.
W74-01485

A LINEAR PROGRAMMING APPROACH TO FLOODPLAIN LAND USE PLANNING IN URBAN AREAS,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
J. C. Day.
American Journal of Agricultural Economics, Vol 55, No 2, p 165-174, May 1973. 1 fig, 3 tab, 22 ref, append.

Descriptors: *Flood plains, *Land use, *Planning, *Management, *Linear programming, Optimization, Economics, Floodproofing, Buildings, Constraints, Systems analysis, Mathematical models.
Identifiers: *Urban areas, Cost minimization, Sensitivity analysis, Land fill, Site elevation.

Floodplain land use management is an approach to flood loss prevention which will complement engineering works and lead to more efficient use and development of urban floodplain areas. A floodplain management plan combining land use through public administration and floodwater control through engineering works is subject to legal, political, administrative and technical difficulties. Needed is a methodology for deriving operating rules for the utilization of water and land resources. Land use management is structured as an optimization problem, using a recursive linear programming assignment model. The objective of the model is to identify the most economically efficient combination of spatial-temporal distribution of land use activities and employment of site elevation and floodproofing given a community's expected growth, land use goals, resource endowment, and existing flood risk. Sensitivity analysis is required because of possible nonlinearities. (Bell-Cornell)
W74-01490

IMPACT OF IRRIGATION INVESTMENTS ON REGIONAL AND URBAN DEVELOPMENT,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-01625

3E. Conservation in Industry

WATER RESOURCES OF THE URAL AREA AND BASIC PROBLEMS IN THEIR COMPLEX USE (VODNYYE RESURSY URALA I OSNOVNYYE PROBLEMY IKH KOMPLEKSNOGO ISPOL'ZOVANIYA),
G. M. Ostrovskiy, O. V. Tyutkov, and A. M. Chernyayev.
Vodnyye Resursy, No 2, p 118-124, 1973. 2 tab, 6 ref.

Descriptors: *Water resources, *Water utilization, Industrial plants, Water loss, Runoff, Water supply, Water types.
Identifiers: *USSR (Ural industrial area).

The Ural Industrial Area, which comprises the Sverdlovsk, Chelyabinsk, Perm', Kurgan, and Orenburg Oblasts, and the Bashkir and Udmurt Autonomous Soviet Socialist Republics, covers 824,000 sq km. Over 80% of the total water used in the area is obtained from rivers and lakes. Average annual streamflow is 127 cu km; in a low-water year of 95% probability, it is 71.1 cu km. The per capita input of water to the Ural Area is about 6,650 cu m/yr, decreasing to 3,520 cu m/yr in the Orenburg Oblast, to 1,900 cu m/yr in the Chelyabinsk Oblast, and to 920 cu m/yr in the Kurgan Oblast. Total water use is currently estimated at 11.6 cu km/yr (about 630 cu m per capita per yr), of which about 80% is industrial use, 17% is domestic use, and about 3% is agricultural use. Total water diversion is estimated at 9.4 cu km/yr. The present system of water use in the area does not ensure its protection from quantiative of qualitative depletion. (Josefson-USGS)
W74-01135

3F. Conservation in Agriculture

POTENTIAL USEFULNESS OF ANTITRANSPIRANTS FOR SOLUTION OF SOME WATER SUPPLY, PLANT GROWTH, AND ENVIRONMENTAL PROBLEMS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 03B.
W74-01105

AGRICULTURAL WATER DEMAND IN NORTH CAROLINA: PHASES I AND II,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 06D.
W74-01112

RELATIONSHIP OF PUMPING LIFT TO ECONOMIC USE OF GROUNDWATER FOR IRRIGATION,
Idaho Univ., Moscow. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 04B.
W74-01120

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
W. Crea.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 1-17, May 1973. 2 append.

Descriptors: *Mapping, *Surveys, *Satellites (Artificial), *Remote sensing, Land use, Soil surveys, Grasslands, Forests, Forestry, Crops, Data collections.
Identifiers: *ERTS.

Results of remote sensing by ERTS approached or exceeded the 90% accuracy level for crop identification of major crops (corn and soybeans in South Dakota, Illinois, and Michigan; field corn and popcorn in Nebraska; winter wheat in Kansas; rice, safflower, asparagus, corn, and cotton in the San Joaquin Valley of California). Detection of field condition (growing crops, wet planted fields, plowed fields, harvested fields) was possible on fields as small as 4 hectares in the Imperial Valley on enlarged (1:62,500) color composites. Softwood, mixedwood, hardwood, agricultural land, and water were successfully mapped using MSS Bands 5 and 7 and a dot grid to measure areas. ERTS-1 is well suited for broad to relatively specific vegetation classification and distribution and for monitoring changes in distribution and condition. Soil associations were delineated through the reflective characteristics of a fairly uniform cover of vegetation using computer analysis of output from a scanning microdensitormeter of MSS Band 7 imagery. (See also W74-01163) (Knapp-USGS)
W74-01164

TWO HARVEST OF CEREAL CROPS PER YEAR WITH IRRIGATION, (IN RUSSIAN),
V. N. Garmashov.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 10 p 8-10, 1971.
Identifiers: Barley, Buckwheat, *Cereal crops, Crop yield, *Harvests, Irrigation, Millet, Oats, *USSR (Crimea).

Summer sowings of barley, oats, millet, and buckwheat were tried on farms of the Crimea. A change of the meteorological conditions at various sowing dates had an effect on the photosynthesis of the plants, their productivity, and yield. It is possible to obtain a harvest of winter wheat or barley and to harvest buckwheat from the same fields in the same year.--Copyright 1973, Biological Abstracts, Inc.
W74-01202

EFFECT OF AN INCREASED WATER RATE IN LIQUID DRESSING ON SUGAR BEET YIELD, (IN RUSSIAN),
Novocherkasskii Inzhenerno-Meliorativnyi Institut (USSR).
V. T. Erin.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 10 p 43-45. 1971. Illus.
Identifiers: *Sugar beet yield, Crop yield, Irrigation, Soils, *Liquid-dressed plants.

The application of comparatively small quantities of water (up to 40 m3/ha) created favorable soil conditions for mobilization of soil resources, greatly improving the water supply of the liquid-dressed plants.--Copyright 1973, Biological Abstracts, Inc.
W74-01211

WATER REGIME OF SUNFLOWER UNDER DIFFERENT CONDITIONS OF PHOSPHORUS NUTRITION, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Maslichnykh i Efiromaslichnykh Kultur, Krasnodar (USSR).
A. A. Borodulina, F. I. Ramazanov, and I. N. Terent'eva.
S-Kh Biol. Vol 7, No 2, p 250-255. 1972. Illus. (English summary).
Identifiers: *Phosphorus fertilizers, *Sunflower, Water regime, Fertilization.

Sunflower yield greatly depends on the increased quantity of soil retained water at the stages of budding, flowering and grain formation. The activation of growth processes conditioned by the high content of mobile water results in a change in the ratio of reproductive and vegetative organs. The regulation of the water regime towards its optimization is achieved with increased rates of P fertilizers. When moisture is low, P fertilizers increase the water-holding capacity of cells, which, in turn, results in the maintenance of the water availability at a higher level than in unfertilized plants.--Copyright 1973, Biological Abstracts, Inc.
W74-01227

EFFECTS OF SHADING AND OF SEASONAL DIFFERENCES IN WEATHERING ON THE GROWTH, SUGAR CONTENT AND SUGAR YIELD OF SUGAR BEET CROPS,
Rothamsted Experimental Station, Harpenden (England).
D. J. Watson, T. Motomatsu, K. Loach, and G. F. J. Milford.
Ann App Biol. Vol 71, No 2, p 159-185. 1972. Illus.
Identifiers: Crop yield, Growth, Irrigation, Nitrogen, Seasonal, *Shading, *Sugar beet crops, *Weather conditions.

The weather in 1967 was sunny and dry and that in 1968 dull and wet, but the yields of dry matter, and particularly of sugar, of the unshaded crop in 2 yr were similar because although net assimilation rate (E) was greater in 1967 than 1968, mean leaf area index (L) in 1968 was almost double that in the 1967 crop. Shading decreased the incoming radiation by 56%; it decreased E proportionally in 1967, increasing L slightly, but it decreased both E (by 44%) and L in 1968. The weights of dry matter and sugar in the roots of the shaded crop were consistently smaller at the end of shading and at final harvest in Oct. in both years. Root weights at final harvest in all shading treatments were proportional to the amount of radiation between June and Sept. Although shading greatly decreased the supply of photosynthate to the roots, it did not change the sugar content percentage of dry matter, except in the early stages of growth when the sugar content rapidly increased. Sugar content percentage of fresh weight of the roots was consistently decreased by shading. The sugar yield of shaded plants was low because the dry weights of the roots were also low. In 1967, extra N applied at the start of shading increased L and the dry weight of the tops in all periods, but had no effect on the dry weight of the roots. Because 1968 was a wet year the irrigation treatment had no effect on E or L except for a slight increase in L during the first period; it had no effect on plant dry weight. Both irrigation and additional N decreased the sugar content percentage of fresh weight of the roots only by altering their water content; sugar percentage of dry matter was unaffected.--Copyright 1973, Biological Abstracts, Inc.
W74-01229

SOIL SALINIZATION UNDER IRRIGATED CULTIVATION,
Haryana Agricultural Univ., Hissar (India). Dept. of Agricultural Engineering.

Indian J Agric Sci. Vol 41, No 12, p 1073-1078. 1971. Illus.
Identifiers: Cultivation, Depletion, *Evapotranspiration, Irrigated crops, Moisture, *Soil salinization, Transpiration, Salinity, *Root zone.

The accumulation of salts in the root zone depth under water cycles (irrigation and evapotranspiration) was analyzed. Assumptions such as linear depletion of moisture through root zone during evapotranspiration and positive displacement of soil water without mixing during leaching were made to simplify the problem for analysis. The resulting equations helped to predict the accumulation and distribution of salts in the root zone depth. The salt build up in the root zone during the growth season, where several irrigation-evapotranspiration cycles were involved, was ascertained.--Copyright 1973, Biological Abstracts, Inc.
W74-01238

THE EFFECT OF SUBSTRATE HUMIDITY ON THE SUPPLY OF MACROELEMENTS TO PLANTS, (IN LATVIAN),
Akademiya Nauk Latviiskoi SSR, Riga. Inst. of Biology.
G. Rinkis.
Latv Psr Zinat Akad Vestis. 7 p 27-32. 1972, Illus, (English summary).
Identifiers: *Elements, *Humidity, *Lettuce, *Spinach, Nitrogen, Potassium, Phosphorus, Calcium, Magnesium.

Regularities of the influence of substrate humidity conditions on the assimilation of N, P, K, Ca, Mg, by lettuce and spinach plants were studied in 2 experiments. In the first experiment lettuce plants were cultivated at 5 gradations of the substrate constant humidity: 20%, 35%, 50%, 65%, 80% of the total humidity (TH). In the second experiment spinach plants at first were cultivated according to the same scheme, but on the 16th day the substrate humidity in variants was raised or lowered. In most cases a higher macroelement content was characteristic for lettuce and spinach plants, cultivated at the optimum substrate humidity (under the conditions of the experiment, from 50% to 60% TH). In variants with a high (80% TH) or slightly lowered humidity (35% TH) a lowering of macroelement content was observed. In variants with a low substrate humidity (20% TH) an increase in the macroelement content was observed.--Copyright 1973, Biological Abstracts, Inc.
W74-01241

EFFECT OF FLOODING ON THE TWOSPOTTED SPIDER MITE AND ITS PREDATORS ON STRAWBERRY IN SOUTHERN CALIFORNIA,
California Univ., Riverside. Citrus Research Center and Agricultural Experiment Station.
V. Voth.
Environ Entomol. Vol 1, No 6, p 717-720. 1972, Illus.
Identifiers: *California, *Biocontrol, Flooding, Phytoseiulus-Persimilis, Predators, Scolothrips-Sexmaculatus, *Spider mites, *Strawberry, *Tetranychus-Urticae.

Biological control of Tetranychus urticae Koch on strawberry was investigated in southern California during 1968-69. Mass releases of Phytoseiulus persimilis Athias-Henriot were made at the equivalent rate of 86,250 total per acre at weekly intervals for 4 wk, starting Jan. 7. Populations of prey and predators were followed at weekly intervals from Dec.-June. A flash flood, resulting from a cloudburst on Feb. 24, destroyed all but 2 replicates (1 check and 1 release) and covered all plants with water for several hours. T. urticae reached a peak population, averaging 508.1 and 484.2 mites/leaflet in the remaining check and release plots, respectively, on April 22. By May 13, T. urticae averaged only 5.0/leaflet in the release plot compared with 178.6/leaflet in the check. P. persimilis reached a peak population, averaging 22.1 mites/leaflet, in the release plot on May 6, compared with 3.0/leaflet in the check. Native predators (primarily Scolothrips sexmaculatus (Pergande)) were adversely affected by the flooding, remaining at low numbers through March 25 and reaching a peak of 0.5 predators/leaflet on May 27.--Copyright 1973, Biological Abstracts, Inc.
W74-01243

NITRATES IN SOIL AND GROUND WATER BENEATH IRRIGATED AND FERTILIZED CROPS,
Agricultural Research Service, Fresno, Calif. Soil and Water Conservation Research Div.
H. I. Nightingale.
Soil Sci. Vol 114, No 4, p 300-311. 1972, Illus.
Identifiers: *Fertilized crops, Grapes, *Irrigated crops, *Nitrates, Orchards, Pollution, *Soil water, Truck crops, Weeds.

A field-scale approach and data reduction methods to evaluate associations between crop N fertilization rates, soil NO3--N concentrations, and ground water NO3--N within a meaningful size area are presented. The cumulative percentage frequency for soil NO3--N concentrations is presented for given soil depth intervals to 6.10 m under 4 crop classifications: no crops (weeds), grapes, row and truck crops. Geometric mean soil NO3--N concentrations depend upon the crop and soil depth, which suggests also a dependence upon soil N fertility management. Soil water content was dependent on soil texture, but was generally independent of the crop. Concentration of NO3--N at some sites in free, perched soil water was apparently related to N-fertilization. Orchards and row and truck crops were the major contributors to the higher concentrations of soil NO3--N. N-Fertilization rates of the various crops were related to the observed levels of soil NO3--N, although relationship became less obvious with increasing depth. Soil NO3--N concentrations and variability are associated with types of crops and their N management practices. A positive correlation exists between N-fertilizer and NO3--N concentrations in the soil solution, but the projected concentration of NO3--N in the ground water is relatively low. Obviously, NO3--N will be lost below the root zone when applied far in excess of crop needs. Increasing N-fertilizer use efficiency to prevent excessive losses to the ground water is a worthwhile goal.--Copyright 1973, Biological Abstracts, Inc.
W74-01245

EFFECT OF PUDDLING ON PHYSICAL PROPERTIES OF RICE SOIL,
Fertilizer Corp. of India, Sindri. Planning and Development Div.
J. D. Naphade, and B. P. Ghildyal.
Indian J Agric Sci. Vol 41, No 12, p 1065-1067. 1972, Illus.
Identifiers: Aggregates, Hydraulic conductivity, *Puddling, *Rice soil, Size distribution, Specific volume, *Soil physical properties.

The physical properties of soil, such as the aggregate size distribution, apparent specific volume and hydraulic conductivity under different degrees of puddling, using a laboratory puddler, were studied to define the physical state of puddled soil. With the increased level of puddling, the dsitribution of finer particles increased owing to the breakdown of natural aggregates. Field puddle and puddling in laboratory due to 0.45 watt hr energy input broke down about 40% of soil aggreagates into fractions smaller than 0.055 mm in size. Puddling with an increased energy input of 0-2.700 watt hr decreased the apparent specific volume and hydraulic conductivity of the soil from 0.714-0.591 cm3/g and 0.192 cm/hr, respectively, and a significant correlation between these 2 properties was observed. The decrease in apparent specific volume and hydraulic conductivity of soil with an increased energy input by puddling was attributed to the reduction in non-capillary pore spaces and the closer packing of soil particles.--Copyright 1973, Biological Abstracts, Inc.
W74-01246

SENSITIVITY OF CELL DIVISION AND CELL ELONGATION TO LOW WATER POTENTIALS IN SOYBEAN HYPOCOTYLS,
Illinois Univ., Urbana. Dept. of Botany.
R. F. Meyer, and J. S. Boyer.
Planta (Berl). Vol 108, No 1 p 77-87. 1972, Illus.
Identifiers: *Cell elongation, Growth, Hypocotyls, Pressure, Sensitivity, Soils, Solute, *Soybean hypocotyls, Transport, Turgor, Water potentials, *Cell division, Osmosis.

The response of cell division and cell elongation to low cell water potentials was studied in etiolated, intact soybean hypocotyls desiccated either by withholding water from seedlings or by subjecting hypocotyls to pressure. Measurements of hypocotyl water potential and osmotic potential indicated that desiccation by withholding water resulted in osmotic adjustment of the hypocotyls so that turgor remained almost constant. The adjustment appeared to involve transport of solutes from the cotyledons to the hypocotyl and permitted growth of the seedlings at water potentials which would have been strongly inhibitory had adjustment not occurred. Growth was ultimately inhibited in hypocotyls due to inhibition of cell division and cell elongation to a similar degree. The inhibition of cell elongation appeared to result from a change in the minimum turgor necessary for growth. On the other hand, when intact hypocotyls were exposed to pressure for 3 hr osmotic adjustment did not occur, turgor decreased, and the sensitivity of growth to low cell water potentials increased, presumably due to inhibition of cell elongation. Thus, although cell division was sensitive to low cell water potentials in soybean hypocotyls, cell elongation had either the same sensitivity or was more sensitive, depending on whether the tissue adjusted osmotically. Osmotic adjustment of hypocotyls may represent a mechanism for preserving growth in seedlings germinating in desiccated soil.--Copyright 1973, Biological Abstracts, Inc.
W74-01249

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR FACILITATORS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
V. Skogerboe, E. Radosevich, and C. Vlachos.
Available from the National Information Service as PB-225 289/8, $8.75 in paper copy, $1.45 in microfiche. Completion Report Series No. 52, Colorado Environmental Resources Center, Fort Collins, June 1973. 428 p, 45 fig, 76 tab, 496 ref, 3 append. OWRR-B-043-COLO.

Descriptors: *Irrigation systems, Prior appropriation, Agriculture, Arizona, Colorado, *Institutional constraints, *Irrigation districts, Irrigation water, *Legal aspects, Nevada, *Social aspects, Utah, Water management (Applied), Water policy, Wyoming.

The results from Phase I have indicated that consolidation of irrigation systems is a necessary part of an integrated policy of water development for improved water management, and of a coordinated effort towards an efficient and effective maximization of limited natural resources. National trends of growth, limited water supplies, the increasing population, and the multiplicity of uses call for new integrated forms of the interaction between policy determining institutions, local participants, and water users at large.
W74-01367

SIMPLIFIED SPECTROPHOTOMETRIC ANALYSIS OF PLANTS FOR SELENIUM,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
For primary bibliographic entry see Field 02K.
W74-01406

DETERMINATION OF MELEIC HYDRAZIDE RESIDUES IN TOBACCO AND VEGETABLES,
Department of Agriculture, Ottawa (Ontario). Chemistry and Biology Research Inst.
For primary bibliographic entry see Field 05A.
W74-01418

A HYBRID MODEL FOR IRRIGATION PLANNING USING CHANCE CONSTRAINED PROGRAMMING AND HYDROLOGIC SIMULATION,
Norwegian Inst. of Urban and Regional Research, Oslo.
For primary bibliographic entry see Field 04B.
W74-01488

ECONOMICS OF RESOURCE USE ON SAMPLE FARMS OF CENTRAL GUJARAT,
Indian Inst. of Management, Ahmedabad.
B. M. Desai.
Indian Journal of Agricultural Economics, Vol 28, No 1, p 71-85, Jan.-Mar. 1973. 4 tab, 9 ref, append.

Descriptors: Water resources, *Irrigation, *Economic efficiency, *Return (Monetary), Agriculture, Crops, Returns to scale, Rainfall, Fertilizers, Labor. Irrigation water, Acreage, Mathematical models, Systems analysis.
Identifiers: *Production functions, *Resource use, *India (Gujarat), Regression coefficients, Least squares method.

The production functions on sample farms in two regions of the Baroda district in India are found to be different, due primarily to the variances in irrigation resource. Considered, in a more developed region (MDR) and in a less developed region (LDR), is whether or not the returns on resource use are maximized and if not, why not. The economic and statistical implications of the selection of functional forms and of variables for estimating production functions for a cross-section of farms are analyzed. Important properties of the three functional forms selected--transcendental, log-log inverse, and Cobb-Douglas--are discussed. Variables are chosen in terms of their relevancy, degree of multicollinearity, and the degree of aggregation. Variables selected include: ratio of acreage under high value crops to total crops acreage; net sown area; and expenditures on fertilizers and organic manures, irrigation water, and hired labor. The gross value of all crops grown on a farm is the dependent variable. Findings reveal an uneconomic use of labor and sub-optimum use of fertilizers in LDR. In MDR, where there is more and more evenly-distributed rainfall and a more reliable artificial irrigation source, sample farmers maximized the net returns over all inputs (that are measured in money units). (Bell-Cornell)
W74-01491

THE INFLUENCE OF SOME CLIMATIC FACTORS ON THE PRODUCTIVITY OF RED CLOVER SEED, (IN SERBO-CROATIAN),
Zegreb Univ. (Yugoslovia). Faculty of Agriculture.
M. Gikic.
Agron Glas. Vol 33, No 9/10, p 537-544. 1971.
Identifiers: *Climatic conditions, *Clover seed (Red), Germination, Light, Photoperiod, Productivity, Relative humidity, Seed, Sun, *Yugoslavia.

The effects of relative humidity, amount of sunlight, photoperiod and soil moisture on red clover seed were studied in Zagreb, Osiijek and Djakovo, Yugoslavia. The relative humidity in Osijek was most favorable for seed germination. The amount of sunlight during flowering was found satisfactory in all 3 test sites: it intensified the work of pollinators, resulting in faster seed germination. The tested areas showed favorable daylight conditions for growing the early, medium early and medium late varieties of red clover.--Copyright 1973, Biological Abstracts, Inc.
W74-01556

PRODUCTIVITY OF CEREAL CROPS ON ERODED CHERNOZEMS AGAINST BOTH NON-FERTILIZED AND FERTILIZED BACKGROUNDS, (IN RUSSIAN),
A. S. Skorodumov, and L. I. Palyanitsyna.
Agrokhimiya. 12 p, 46-55. 1971. Illus.
Identifiers: *Cereal crops, *Chernozems, Corn, Crop yield, *Eroded soil, Fertilized areas, Millet, Nonfertilized areas, Oats, Productivity, Wheat.

Moisture reserves and the content of basic nutrients in chernozems of northern forest-steppes

decreased depending on erodibility, and increased on alluvial soils. On non-fertilized eroded chernozems the cultures in order of increasing reaction to erodibility are: winter wheat, millet, oats, and corn. On alluvial soils yields of corn, then of millet, oats, and winter wheat increased. Fertilizers increased the yields more on eroded soils than on non-eroded and alluvial soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01557

PHYSICAL EDAPHOLOGY. THE PHYSICS OF IRRIGATED AND NONIRRIGATED SOILS,
For primary bibliographic entry see Field 02G.
W74-01572

THE CARBOHYDRATE AND WATER BALANCE OF BEANS (VICIA FABA) ATTACKED BY BROOMRAPE (OROBANCHE CRENATA),
Royal Univ. of Malta, Valletta. Dept. of Biology.
P. J. Whitney.
Ann Appl Biol, Vol 70, No 1, p 59-66, 1972, Illus.
Identifiers: *Beans, *Broomrape, *Carbohydrates, Concentration, Desiccation, Orobanche-crenata, Sugar, Vicia-faba, *Water balance.

O. crenata parasitizing beans maintained a slightly higher osmotic pressure than the bean roots, largely because of the higher concentration of sugars in the broomrape tissues. The sugar was withdrawn from the bean mainly as sucrose, which was hydrolyzed to glucose and fructose by the Orobanche. These sugars were then rapidly translocated to the developing flower spike. As well as maintaining a high osmotic pressure this hydrolysis insured sucrose concentration gradient between host and parasite. In the field, bean plants showed wilt symptoms at about the time that the Orobanche flower spikes emerged. The higher the level of infection the lower was the water content of the host. This fall in water content was due to increased water loss by the bean shoots and it seemed unlikely that it was due to water removal by the parasite. The death of the bean was due to desiccation brought about largely by the reduced ability of the carbohydrate-starved roots to extract water from the soil.--Copyright 1973, Biological Abstracts, Inc.
W74-01575

WATER REQUIREMENTS OF WHEAT AND COTTON ON A HIGH WATER TABLE SOIL UNDER ARID CONDITIONS,
West Pakistan Agricultural Univ., Lyallpur. Dept. of Agronomy.
R. A. Khan, S. Ahmad, and M. S. Sharar.
Exp Agric. Vol 9, No 1, p 41-45. 1973.
Identifiers: Arid lands, *Cotton, Irrigation, *Pakistan, *Soils, *Wheat, Water table.

The effects of irrigation on the yields of wheat and cotton were studied on a sandy clay loam soil, with a water table at 7 ft below ground, under the arid conditions of Lyallpur (Pakistan). The conventional practice of providing 19-acre in. of water to Mexican wheat and 25-acre in. to American cotton proved to be a wasteful and unproductive practice on such soils. High yields of both these crops could be obtained without any subsequent watering after an initial 4-in. irrigation applied for seedbed preparation and sowing, while 13-in. irrigation after sowing was needed to obtain maximum yields.--Copyright 1973, Biological Abstracts, Inc.
W74-01595

CROP ROTATION SCHEMES FOR OPTIMAL UTILIZATION OF AGRICULTURAL LAND,
Florida State Univ., Tallahassee. Dept. of Economics.
T. K. Kumar, and S. Awasthi.
Indian J Agric Sci. Vol 42, No 6, p 448-452. 1972.
Identifiers: Agricultural lands, Computer programs, *Crop rotation, *Irrigation cost, *Optimal utilization, Soils.

The production yield, the irrigation cost and the quality of crop depend on the order in which the crops are cultivated, as well as on the soil type. Twenty-nine crop rotations and 5 soil types were considered. Net revenue maximization (subject to the resource restrictions, consistency conditions and the minimum crop yields required) was formulated and solved as a linear programming problem.--Copyright 1973, Biological Abstracts, Inc.
W74-01596

DIURNAL CHANGES IN TRANSPIRATION AND DAILY PHOTOSYNTHETIC RATER OF SEVERAL CROP PLANTS,
Agricultural Research Service, Watkinsville, Ga.
For primary bibliographic entry see Field 02D.
W74-01597

EFFECT OF MOISTURE STRESS ON SOYBEAN (GLYCINE MAX (L.) MERR.),
Indian Council of Agricultural Research, New Delhi.
N. C. Tripathi.
Indian J Agric Sci. Vol 42, No 7, p 583-585. 1972.
Identifiers: Glycine-Max, *Moisture stress, *Soybeans, *Crop yield, Irrigation reduction.

The effect of withdrawal of irrigation at various physiological stages of G. max on the consumptive use of water and yield and yield components was studied. The consumptive use varied 12.9-33.6 cm. Maximum yield of Feb.-planted soybean could be obtained when irrigation was given at intervals of 10 days up to the bean-filled stage. When the plants were subjected to moisture stress at flowering, considerable reduction in number of pods, leaf area and length of internode occurred. Moisture stress at pod-development stage was slightly less deterimental to yield than that at flowering stage.--Copyright 1973, Biological Abstracts, Inc.
W74-01599

STOMATAL-DIFFUSION RESISTANCE AND WATER POTENTIAL OF SOYBEAN AND SORGHUM LEAVES,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
I. D. Teare, and E. T. Kanemasu.
New Phytol. Vol 71, No 5, p 805-810. 1972. Illus.
Identifiers: Leaves, Porometer, Psychrometer, Resistance, *Sorghum leaves, *Soybean leaves, *Stomatal diffusion resistance, Thermocouple, *Transpiration, Water potential.

Hourly trends in stomatal resistance and water potential of the upper leaves of sorghum and of soybean (measured with diffusion porometer and thermocouple psychrometer) tended to parallel each other. Vertical profiles (both canopies) indicated that the stomatal resistance of the lower leaves usually was greater than that of the upper leaves. The position of minimum resistance varied with time of day. The profiles of temperature and water-vapor pressure were consistent with the profile of canopy transpiration resistance. The upper sorghum leaves had a lower water potential than the lower leaves. In the morning a strong gradient of water potential existed from lower to upper leaves in plants in both canopies; in the afternoon the gradients continued in sorghum but disappeared in soybean plants.--Copyright 1973, Biological Abstracts, Inc.
W74-01605

SYSTEM OF TREATING IRRIGATED SOIL WHICH IS SOWN WITH SUGAR BEETS, (IN RUSSIAN),
A. M. Pishnamazov.
Dokl Akad Nauk Az SSR. Vol 27, No 11/12, p 72-75. 1971.
Identifiers: *Irrigated soils, *Sugar beets growth, *Soil treatment, Crop yield, *USSR (Azerbaidzhan).

The effect of soil preparation on growth and yield of sugar beets grown on the heavy soil at the Mingechaurskii Scientific Station in the Azerbaidzhan SSR was investigated. The moisture content was high in fields prepared by scuffling of the stubble field soil done twice and pre-plowing irrigation. Production was higher when harrowing was added to this process. On the Kovlarskii Scientific Station a single scuffling was most productive. On the weedy soils of E Shervan, preliminary scuffling with subsequent fall plowing was effective. In general, pre-scuffling watering, double scuffling and treatment of the soil to a depth of 27 cm in Oct. supplied the highest yield.--Copyright 1973, Biological Abstracts, Inc.
W74-01606

IMPACT OF IRRIGATION INVESTMENTS ON REGIONAL AND URBAN DEVELOPMENT,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-01625

SOIL AND WATER CONSERVATION ON ARABLE LANDS,
Soils Inst., Tehran (Iran). Soil and Water Conservation Div.
A. Ganjini, and B. Azimi.
In: Cento Seminar on Agricultural Aspects of Arid and Semi-arid Zones, September 19-23, 1972, Thran, Iran, Central Treaty Organization, p 164-171, 1972. 4 tabs.

Descriptors: *Climatology, *Arid climates, Semiarid climates, *Soil conservation, *Water conservation, Precipitation (Atmospheric), Temperature, Rainfall, Evaporation, Water loss, *Agronomy.
Identifiers: *Iran, Middle East.

Classification of arid and semiarid areas for agriculture development programs must be determined by considering more than on climatological factor such as precipitation rate, rain distribution, changes in temperature, air currents, evaporation and light intensity. To determine the degree of aridity, two approaches are used: first, determination is made on the basis of temperature and rainfall, and second, determination is based on consideration of evaporation and rainfall. Data analyzed for Iran shows that more than nine-tenths of the total area of the country is arid/semiarid. Also discussed are the causes of water loss and soil erosion in arid and semiarid areas placing emphasis on the increasing soil erosion and water loss in Iran that limits agricultural development. (Bahre-Arizona)
W74-01633

04. WATER QUANTITY MANAGEMENT AND CONTROL

IRRIGATION WATERS OF THE INDUS PLAINS AND THEIR SALT LOAD,
Irrigation Research Council, Islamabad (Pakistan).
For primary bibliographic entry see Field 03C.
W74-01639

4A. Control of Water on the Surface

REPORT OF ATTITUDES AND OPINIONS OF RECREATIONISTS TOWARDS WILD AND

SCENIC RIVERS: A CASE STUDY OF THE ST. JOE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W74-01102

A STOCHASTIC MODEL OF STREAMFLOW BASED ON THE THEORY OF FUNCTIONS OF MARKOV PROCESSES,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 02E.
W74-01123

SURFACE-WATER RESOURCES OF THE USSR AND THEIR CHANGE RESULTING FROM HUMAN ECONOMIC ACTIVITY (RESURSY POVERKHNOSTNYKH VOD SSSR I IKH IZMENENIYE POD VLIYANIYEM KHOZYAYSTVENNOY DEYATEL'NOSTI),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
K. P. Voskresenskiy, A. A. Sokolov, and I. A. Shiklomanov.
Vodnyye Resursy, No 2, p 33-57, 1973. 14 tab, 22 ref.

Descriptors: Water resources, *Surface waters, *Surface water availability, *Human population, *Variability, Fluctuations, Rivers, Lakes, Reservoirs, Glaciers, Hydrologic cycle, Runoff, Water utilization, Water supply, Forecasting, Seasonal.
Identifiers: *USSR.

The average volume of surface water in the USSR, including the volume of water stored in glaciers and large freshwater lakes, is about 42,000 cu km, of which 4,714 cu km is average annual streamflow. Areal distribution of water resources in the USSR is extremely uneven. The total amount of river water varies slightly from year to year. In individual years, large areas may experience a water shortage or have an excess water supply. Factors affecting hydrologic regimen and streamflow are reservoir construction and operation, irrigation and flooding of lands, industrial and municipal water consumption, afforestation in river basins, drainage of bogs and saturated soils, and urbanization. As of 1970, the total decrease in runoff on 17 major USSR rivers as a result of man's activities was about 55 cu km/year or 1.2% of the country's total river-water resources. Runoff on individual rivers decreased by 10%-20%. Diminished streamflow is expected to reach 120 cu km/year (2.5%) by 1981-85 and 180 cu km/year (3.8%) by 1990-2000. (Josefson-USGS)
W74-01133

NEAR REAL TIME WATER RESOURCES DATA FOR RIVER BASIN MANAGEMENT,
Geological Survey, Harrisburg, Pa.
R. W. Paulson.
Available from NTIS, Springfield, Va. 22151 as E73-10451 Price $3.00 printed copy; $1.45 microfiche. Type II Progress Report to NASA for period July 1, 1972 to December 31, 1972-January 1973. 28 p.

Descriptors: *Remote sensing, *Hydrologic data, *Delaware River, *Data collections, Streamflow, Gaging stations, Water wells, Water quality, Telemetry, Satellites (Artificial), Data processing, Computer programs, Water resources.
Identifiers: *Real time data.

Twenty Data Collection Platforms (DCP) are being field installed on USGS water resources stations in the Delaware River basin. DCP's are operating on five stream gaging stations, three observation wells, and one water-quality monitor in the basin. DCP's have been installed at nine additional water-quality monitors. ERTS-relayed water resources data from platforms are being provided in near real time, by the Goddard Space Flight Center, to the Pennsylvania district, Water Resources Division, U.S. Geological Survey. On a daily basis, the data are computer processed by the Survey and provided to the Delaware River Basin Commission. Each daily summary contains data that were relayed during 4 or 5 of the 15 orbits made by ERTS during the previous day. Water-resources parameters relayed by the platforms include dissolved oxygen concentration, temperature, pH, specific conductance, well level and stream-gage height, which is used to compute streamflow for the daily summary. (Woodard-USGS)
W74-01150

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY REPORTS.
For primary bibliographic entry see Field 07C.
W74-01163

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 03F.
W74-01164

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab.
D. W. Mooneyhan.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA Goddard Space Flight Center Publication X-650-73-155, p 18-29, May 1973. 2 append.

Descriptors: *Mapping, *Land use, *Satellites (Artificial), *Remote sensing, Urbanization, Data collections, Planning.
Identifiers: *ERTS.

ERTS imagery can be used for cartographic photobase products at scales 1:500,000 and smaller. In addition, the ERTS imagery can be used for photographic products to complement existing line maps at scales at least as large as 1:250,000, and to support the revision of existing line maps at many scales. Geometric accuracy is adequate for the interpretation of land use. Objects as small as 100 m in diameter and linear features as narrow as 15 m have been identified. Repetitive coverage increases accuracy and number of categories considerably. A larger number of land-use categories could be determined by the use of all four channels of ERTS data in conjunction with automatic pattern recognition programs than could be determined from image interpretation. In urban areas, generally three to four categories could be mapped. (See also W74-01163) (Knapp-USGS)
W74-01165

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01168

MULTIDISCIPLINARY/REGIONAL RESOURCE SURVEYS,
National Aeronautics and Space Administration, Wallops Island, Va. Wallops Station.
For primary bibliographic entry see Field 07B.
W74-01171

DEVELOPMENT OF A TIME-SPACE PREDICTION TECHNIQUE TO EVALUATE SNOWPACKS IN AND ADJACENT TO FOREST OPENINGS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 03B.
W74-01231

DIE-BACK IN THE MIXED HARDWOOD FORESTS OF EASTERN VICTORIA: A PRELIMINARY REPORT,
Forests Commission of Victoria, Melbourne (Australia).
G. C. Marks, F. Y. Kassaby, and S. T. Reynolds.
Aust J Bot. Vol 20, No. 2 p 141-154. 1972, Illus.
Identifiers: *Australia (Victoria), *Dieback (Forests), Distribution, *Eucalyptus, Forests, *Hardwood forests, Identification methods, Phytophthora-Cinnamomi.

The distribution and symptons of die-back in the mixed-species eucalypt hardwood forests of eastern Victora, Australia, are described. The disease was recognized in 1952 in small patches of forest situated in the flat, badly drained sandy coastal soils and has spread rapidly. This spread was associated with above-average rainfall during spring, summer and autumn. Disease symptoms were similar to that caused by drought, and were observed best during dry periods following summer rain. The lupin bait of Chee and Newhook was used to isolate Phytophthora cinnamomi from the diseased areas, and the field symptoms seen on susceptible eucalypts of the subgenus Renantherae were similar to those observed on young saplings inoculated with P. cinnamoni in the greenhouse. Species of the subgenus Macrantheae observed in the forests and tested in the greenhouse are tolerant to the disease. Estimates of population density indices of the fungus gave highest values in areas where the disease was most active. The fungus was not isolated from adjacent healthy forests. Improvements in the baiting and identification of P. cinnamomi with use of excised lupin radicles floated over a small sample of soil in a petri dish are described. Several variants of the fungus with differing growth rates were isolated.--Copyright 1973, Biological Abstracts, Inc.
W74-01251

EFFECTS OF PARAQUAT ON INVERTEBRATES IN A CANTEBURY STREAM, NEW ZEALAND,
Ministry of Agriculture and Fisheries, Wellington (New Zealand). Fisheries Research Div.
For primary bibliographic entry see Field 05C.
W74-01298

A METHOD OF FORECASTING THE BUILDING OF A RIVER BAR (METOD PROGNOZA PEREFORMIROVANIY RECHNOGO BARA),
Moscow State Univ. (USSR). Chair of Gemorphology.
For primary bibliographic entry see Field 02J.
W74-01388

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH,
L. L. McBride.
Ecology Law Quarterly, Vol 2, p 357-384, Spring 1972. 149 ref.

Descriptors: *Arizona, *Water resources development, *Community development, Legal aspects, Water law, Water consumption, Public health, Water policy, Water management, Human population.

A comprehensive analysis is presented of the water supply problems facing the state of Arizona. It explores the supply and demand of water resources in order to determine whether water supply will set an upper limit on the population growth. The current law governing water rights is

discussed in relation to its effect on water consumption and on growth patterns. Prospects are evaluated for maintaining consumption and the present growth rates by increasing the water supply, or, in the alternative, by altering the current water rights system to prevent the exhaustion of water resources. The Colorado River is the major source of surface water for Arizona and the adjoining areas of the Lower Colorado Basin, which also includes the Las Vegas area of Nevada, and the Imperial and Coachella Valleys of southeastern California. However, as accompanying tables indicate, Arizona has completely insufficient supplies of surface water to meet the total demand. Possible future sources include desalinization and inter-regional water diversion. (Mockler-Florida)
W74-01452

STORM DRAINAGE AND FLOOD CONTROL FOR METROPOLITAN DENVER.
Denver Regional Council of Governments, Colo.

Project reuse summary report. May, 1973. 18 p, 1 fig, 4 tab, photos.

Descriptors: *River basin development, *Regional planning, *Flood control, *Colorado, Flood Plain Zoning, Storm runoff, Criteria, Standards, Coordination, Urban drainage, Flood plain insurance, Financing.
Identifiers: *Preventive master planning, Project REUSE, Design master planning, Flood warning systems, *Denver (Colo).

The proposed 20-year storm drainage and flood control program under Project REUSE (Renewing the Environment through Systems Engineering) encompasses three types of major drainage activities: (1) preventive master planning, for areas where flood plain regulation, land use controls, and other preventive action can be utilized; (2) design master planning, for areas where problems already exist and facility construction is known to be required; and, (3) construction, for developed areas where preventive measures are not feasible and where channels, culverts, sewers, and other structures are needed to provide protection. The system will provide for: delineation of flood plains on major drainage channels; regulation of all unoccupied 100-year flood plains; 100-year protection on occupied flood plains; National Flood Insurance Program coverage on occupied flood plains where protection is not cost effective; the provision, by ordinance, for limitation of runoff from new real estate development; flood storage capacity and spillway protection on dams in the region; integration of major drainage measures with the regional water resource management system; and, an early flood warning system. Cost estimates and an implementation schedule by basin are included. (Hoffman-North Carolina)
W74-01475

REPORT ON LAUREL CREEK CHANNEL IMPROVEMENTS, WATERLOO AND BRIDGEPORT, ONTARIO.
Kilbom Engineering Ltd., Toronto (Ontario).

Prepared for Grand River Conservation Authority, Cambridge, Ontario. December 1972. 53 p, 7 fig, 2 tab, 4 plates, 4 append.

Descriptors: *Flood protection, *Channel improvement, *Aeration, Flood control, Erosion control, Culverts, Water quality control, Oxygen demand, *Canada, Farm wastes.
Identifiers: *Cascades, Fountains, Bubbler systems, Aerators.

Laurel Creek, which flows through Waterloo and Bridgeport, Ontario, has caused flooding and erosion problems. During low flow periods, water quality has been adversely affected by pollutants entering the stream. Design flows for the Creek were based on calculations of the 100-year floods, assuming a certain degree of future urbanization and certain runoff proportions. To accomodate the 100-year flood, sections of box culvert, concrete-lined, grass-lined, and rip-rap-lined channels are recommended at various locations, depending on land costs. A dam above Waterloo is an alternative solution, but only one site is feasible. The dam was recommended in 1965, but is not recommended now. The culverts could be built in three identified stages, thereby spreading costs over time. Water quality of Laurel Creek is compared to Ontario Water Resources Commission standards. Water quality is generally good, but could be improved by aeration. Farm wastes in the spring is a problem to the Creek, adding carbon, nitrogen, and phosphorus, and contributing to biological oxygen demand. Techniques of aerating water, i.e. cascades, fountains, bubbler systems, and mechanical aerators are described and illustrated. Cascades along the channel in Waterloo and Bridgeport are suggested as the best aeration method for Laurel Creek. (Stein-North Carolina)
W74-01482

FLOODLAND AND SHORELAND DEVELOPMENT GUIDE.
Southeastern Wisconsin Regional Planning Commission, Waukesha.

Planning Guide No. 5, November 1968. 199 p, 47 fig, 9 maps, 56 ref, 17 append.

Descriptors: *Flood protection, *Pollution abatement, *Urbanization, Water quality control, Flood control, Land management, Regulation, *Wisconsin, Comprehensive planning.
Identifiers: *Shoreland management, *Floodplain management, *Land use planning, Environmental corridors.

The nature of floodland and shoreland problems and proposed comprehensive programs to deal with these problems are presented. This guideline report is intended to be used by cities and counties in Southeastern Wisconsin to help local governments solve their water resource problems and to coordinate them into a regional management framework. Many of the problems discussed relate to urbanization in critical water management areas where natural processes are adversely affected or to water quality problems created by poorly planned urban development. Thus, the need for comprehensive land use and water use planning is stressed and various program elements are outlined: protection of existing development, e.g. flood warning and floodproofing; removal of existing development; discouragement of new development, e.g. tax and finance policies; regulation of new development, e.g. zoning and sanitary ordinances; abatement of pollution, e.g. diversion of wastewater and low flow augmentation. A section on legal authority and administration of ordinances and regulations is included. (Elfers-North Carolina)
W74-01483

STUDY OF THE SPEED OF WATER CIRCULATION IN A WATER-BEARING LIMESTONE DEPOSIT BY TRACING TESTS (LA SERRIERE RIVER BASIN/NE),
Neuchatel Univ. (Switzerland). Centre de Hydrogeologie.
For primary bibliographic entry see Field 02F.
W74-01563

EXPERIMENTAL ESTABLISHMENT OF FOREST PLANTATIONS ON SANDS, IN ACCORDANCE WITH THE IDEA OF G. N. VYSOTSKII (IN RUSSIAN),
For primary bibliographic entry see Field 02I.
W74-01569

PROTECTIVE FUNCTION OF THE FOREST IN AREAS OF WATERWORK RESERVOIRS, (IN CZECH),
Vysoka Skola Zemedelska, Brno (Czechoslovakia). Fakulta Lesnicka.
L. Skatula.
Acta Univ Agric Fac Silvic. Vol 40, No 2, p 119-124. 1971, Illus.
Identifiers: *Forest, Human health, Pollution, Protective foundations, Reservoirs, *Waterwork reservoirs, *Water supply, Water purity.

The necessity of protecting the water supply on its way from springs to the points where it enters other recipients is emphasized. The use of water is ever-growing as is the contamination of water. Properly-managed forest stands could protect the water resources and efficiently influence the purity of the resources and human health.--Copyright 1973, Biological Abstracts, Inc.
W74-01582

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN, MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District. Mobile, Ala.

Available from National Technical Information Service, as EIS-MS-72-5336-F, $8.00 paper copy, $1.45 microfiche. 1972. 106 p, 4 plate.

Descriptors: *Mississippi, *Environmental effects, *Flood control, Water quality control, Watershed management, Recreation, Dams, Water supply, Wildlife habitat, Forests, Agriculture.
Identifiers: *Environmental impact statements.

The project would serve to initiate land acquisition and construction of a dam 7,880 feet long for the purpose of impounding waters of Tallahala Creek to provide flood control, water supply, water quality control and recreation, including fish and wildlife enhancement. Adverse environmental effects include loss of 4,435 acres of agricultural and forest land and its associated wildlife habitat and loss of free-flowing stream fisheries. Desirable effects include providing a dependable water supply and high quality recreation. Alternatives considered included alternative sites and single purpose projects; however, these are considered less efficacious or economically infeasible. Also, no development at all was considered as an alternative. The project is authorized by the Flood Control Act of 1968 and is currently in the preconstruction planning stage. (Mockler-Florida)
W74-01610

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT,
Geological Survey.
J. F. Turner, Jr.
Open File Report, No 72025, 1972. 107 p, 4 tab, 28 illus.

Descriptors: *Florida, *Hydrograph analysis, *Flood forecasting, River forecasting, River basins, Comprehensive planning, Flood control, Flood prevention, River basin development, Streamflow.

Serious water-management problems are being caused by flood-plain development in the Hillsborough and Alafia River Basins. Encroachment by urban development of the flood-prone areas has greatly increased in recent years. The U.S. Corps of Engineers have proposed the construction of numerous flood-retention reservoirs on many headwater tributaries, as well as other flood control measures including a bypass canal for the Hillsborough River. The by-pass canal would divert a significant part of flood water from the Hillsborough River to Tampa Bay, thereby preventing flooding of the Tampa-Temple Terrace

area except under the most extreme conditions. Additional drainage improvements are also proposed for the upper reaches of the basin. The objective of the investigation is to develop mathematical models that simulate segments of the streamflow hydrograph. Simulated streamflow discharges will be used in evaluating and implementing flood control and abatement programs within these basins. (Mockler-Florida)
W74-01611

ALLUVION, ISLANDS, AND SAND BARS,
For primary bibliographic entry see Field 06E.
W74-01612

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-01621

HYDROLOGICAL INFORMATION FOR THE PLANNING OF WATER RESOURCES IN DEVELOPING COUNTRIES (L'INFORMATION HYDROLOGIQUE POUR LA PLANIFICATION DES RESOURCES HYDRAULIQUES DANS LES PAYS EN VOIE DE DEVELOPPEMENT),
Office de la Recherche Scientifique et Technique OUtre-Mer, Paris (France).
For primary bibliographic entry see Field 07C.
W74-01623

WATER RESOURCES PLANNING MOZAMBIQUE (LA PLANIFICATION DES RESOURCES EN EAU AU MOZAMIQUE),
Servicos Hidraulicos, Lourenco Marques (Mozambique).
For primary bibliographic entry see Field 06B.
W74-01629

BRUSH ERADICATING, BASIN PITTING, AND SEEDING MACHINE FOR ARID TO SEMIARID RANGELAND,
New Mexico State Univ., University Park. Dept. of Agriculture Engineering.
G. H. Abernathy, and C. H. Herbel.
Journal of Range Management, Vol 26, No 3, p 189-192, May 1973. 5 fig, 2 tab, 5 ref.

Descriptors: *Range management, *Arid climates, *Semiarid climates, Shrubs, Desert plants, *New Mexico, Southwest U.S., Planting management, Seeds, Viability, Land reclamation, Mechanical control, *Revegetation.
Identifiers: *Creosotebush, *Tarbush.

Several million acres of once productive rangeland in arid and semiarid areas have been invaded by noxious shrubs such as creosotebush (Larrea tridentata) and tarbush (Flourensia curnua). These shrubs do not produce useful forage for livestock or wildlife, nor adequate ground cover to prevent soil erosion. A range seeding machine that increases the chances of successful seeding establishment on arid to semiarid rangeland has been designed and tested on 23 plots in southern New Mexico. Working behind a standard rootplow, the machine picks up brush, forms basin pits, firms the soil, plants seed, and replaces the brush over the planted area as a mulch. Most plots were about 5 acres and were seeded with a mixture of desirable forage species adapted to the site. About 5 percent of the seedings were considered successful. Studies demonstrated that much of the depleted rangeland in southern New Mexico can be restored. On sites completely dominated by creosotebush and tarbush, rootplowing followed by seeding with proper equipment can be effective. Site requirements include: fine-textured soil to resist wind erosion, a slope percent low enough to resist water erosion, and reasonable rainfall. (Black-Arizona)
W74-01637

EFFECTS OF LEAF-FOOTED BUGS ON MESQUITE REPRODUCTION,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
D. N. Ueckert.
Journal of Range Management, Vol 26,No 3, p 227-229, May 1973. 4 fig, 1 tab, 13 ref.

Descriptors: *Mesquite, *Weed control, *Range management, *Invasion, Desert plants, *Texas, Southwest U.S., Insects, Plant populations, Biocontrol, Seeds, Poisonous plants, Browse utilization, Germination.
Identifiers: *Rolling Plains (Texas).

Mesquite (Prosopis glandulosa) infests millions of acres of arid and semiarid southwestern rangeland and is constantly invading or increasing in herbaceous plant communities. As a method of controlling this weed, conservation of existing weed-feeding insects has been suggested. In a sleeve cage study, various population densities of leaf-footed bugs (Mozena obtusa Uhler) were observed feeding on immature mesquite pods in the Rolling Plains of Texas. Their feeding significantly increased the abortion of immature mesquite pods while decreasing the dry weight of pods and seeds and the germination percentage of seeds. Seedlings from seeds fed upon by this insect were significantly smaller and less bigorous than thos from bug-free seeds. This insect may limit the reproduction of mesquite and may offer a possible method of control. However, where stockmen depend upon mesquite pods for emergency livestock feed, this source of energy and protein would be significantly reduced by the insects if population densities should become high. (Black-Arizona)
W74-01638

CONCEPT-SCALE INTERACTION WITH THE SEMANTIC DIFFERENTIAL TECHNIQUE,
Virginia Polytechnic Inst. and State Univ, Blacksburg. Dept. of Sociology.
For primary bibliographic entry see Field 06B.
W74-01644

4B. Groundwater Management

PREDICTION OF WELL DEVELOPMENT POSSIBILITIES IN DELAWARE BY MEANS OF CALIBRATED GAMMA-RAY LOGS,
Delaware Geological Survey, Newark.
K. D. Woodruff.
Available from the National Technical Information Service as PB-225 120/5, $2.75 in paper copy, $1.45 in microfiche. University of Delaware, Newark. Project Completion Report, August 1973. 19 p, 6 fig, 2 tab, 9 ref. OWRR A-023-DEL (1).

Descriptors: *Borehole geophysics, *Radioactive well logging, *Logging (Recording), *Water wells, Subsurface investigations, Water supply forecasting, Clays, *Delaware.
Identifiers: *Well development prediction.

Small amounts of clay within sandy Coastal Plain sediments of northern Delaware often hinder successful well development. Clays usually show relatively higher gamma radiation than do sands. Thus it was thought that gamma radiation logging techniques could be refined to determine the amount of clay within a given depth interval and thus predict the chances for successful well development. Test holes were augered to various depths in selected formations and cores were taken every five feet. A gamma log was run through the hollow stem augers in the completed hole and again in the open hole after the augers were pulled. The output of the gamma probe was calibrated in counts per second. The core samples were analyzed for clay percentages and the clay percentages compared against the gamma readings for the corresponding depths. Results showed that a rough set of curves showing counts per second versus clay percentage could be made for various hole conditions. However, local drillers report difficulty in well development when clay percentages are as low as 2% to 5%. At this low range the possible statistical error of any one gamma reading can give over a 5% possible error in prediction of clay content. Preliminary work showed that this problem might be overcome by holding the gamma probe at rest opposite the depth of interest and counting pulses with an electronic counter.
W74-01106

CALCULATION OF PERMEABILITY OF CRETACEOUS SANDSTONES FROM PUMPING AND STATIC LEVEL DATA IN SELECTED AREAS OF WESTERN SOUTH DAKOTA,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 02F.
W74-01113

DETERMINATION OF THE TOTAL STORAGE CAPACITY OF THE CRETACEOUS SANDSTONE AQUIFERS IN SOUTH DAKOTA,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 02F.
W74-01114

RELATIONSHIP OF PUMPING LIFT TO ECONOMIC USE OF GROUNDWATER FOR IRRIGATION,
Idaho Univ., Moscow. Dept. of Agricultural Engineering.
G. L. Corey, and K. H. Lindeborg.
Available from the National Technical Information Service as PB-225 147/8, $2.75 in paper copy, $1.45 in microfiche. Idaho University Water Resources Research Institute, Research Project, Technical Completion Report, April 1971. 4 p, 7 ref. OWRR B-006-IDA (3).

Descriptors: *Irrigation, *Groundwater, *Pumping, *Economic efficiency, *Idaho, Crop response, Crop production, Agriculture, Costs, Evaluation, Economic justification, Data collections, Grains (Crops), Potatoes, Alfalfa, Beans, Sugar beets.

Field data were collected on projects and farms in the irrigated areas of southern Idaho. Guidelines were made as to how high groundwater could be lifted and still be economically supplied to irrigation farmers. The economic maximum lift was about 680 feet on a 400-acre farm, and about 770 feet on a 600-acre farm with an irrigation efficiency of 55% on both farms. The five major crops included in the analysis were grain, potatoes, alfalfa, beans and sugar beets. The total farm returns to water and management for the typical farms ranged from $25 on the 200-acre farm to $52 on the 600-acre farm. The comparable optimum farm returns ranged from $30 on the 200-acre farm to $56 on the 600-acre farm. The results of the optimum allocation of the resource are very close to the results of the typical farms, which indicates that the farmers included in the sampling are actually operating their farm at the economic optimum level. (Woodard-USGS)
W74-01120

BALANCE ESTIMATE OF GROUNDWATER RESOURCES ON THE NORTHWESTERN SLOPE OF THE CAUCASUS (BALANSOVAYA OTSENKA RESURSOV PODZEMNYKH VOD

SEVERO-ZAPADNOGO SKLONA BOL'SHOGO KAVKAZA),
V. I. Klimenko.
Vodnyye Resursy, No 2, p 130-133, 1973. 2 ref.

Descriptors: *Groundwater resources, *Groundwater basins, *Artesian aquifers, *Confined water, *Water balance, Precipitation (Atmospheric), Runoff, Flow, Base flow, Hydrodynamics, Estimating.
Identifiers: *USSR (Caucasus Mountains), Water exchange.

The northwestern slope of the Caucasus is the major source of supply of natural groundwater to the large Azov-Kuban' artesian basin, covering more than 110,000 sq km. Precipitation in the area of the basin is 533 mm; total runoff is 167 mm; surface runoff 92 mm; groundwater runoff is 51 mm; artesian flow is 24 mm; and evaporation is 366 mm. The rate of groundwater recharge is 2.1 million cu m/day. Groundwater discharge into the Kuban' River is 700,000 cu m/day, into the Don and Manych Rivers--90,000 cu m/day, and into the Sea of Azov--1.17 million cu m/day. Formation and distribution patterns of deep artesian flow in the basin are examined, and rates of exchange of water between Neogene and Paleogene artesian aquifers are determined. (Josefson-USGS)
W74-01136

REGIONAL ESTIMATE OF BRACKISH- AND SALINE-GROUNDWATER YIELD (REGIONAL'NAYA OTSENKA EKSPLUATATSIONNYKH RESURSOV SOLONOVATYKH I SOLENYKH PODZEMNYKH VOD),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
M. R. Nikitin, and K. N. Tsyganova.
Vodnyye Resursy, No 2, p 134-149, 1973. 5 fig, 4 tab, 10 ref.

Descriptors: *Groundwater, *Saline water, *Brackish water, *Water yield, *Estimating, Water supply, Water utilization, Aquifers, Confined water, Costs, Economic efficiency, Maps, Equations.
Identifiers: *USSR (Kalmyk ASSR), Minerlaization.

General problems involved in a regional estimate of the rate at which brackish and saline groundwater can be artificially withdrawn for water supply are examined. Principles and techniques of such an estimate are described and applied to saline groundwater in the southwestern part of the Caspian Lowland in the Kalmyk ASSR. Potential yield of brackish and saline groundwater in Quaternary and Upper Pliocene deposits of the Republic is estimated at 96.5 cu m/sec, and areal potential yield is 1.4 liter/sec/sq km. (Josefson-USGS)
W74-01137

PROBLEMS IN REGIONAL DYNAMICS OF ARTESIAN WATER (PROBLEMY REGIONAL'NOY DINAMIKI ARTEZIANSKIKH VOD),
For primary bibliographic entry see Field 02F.
W74-01141

HYDROGEOLOGIC CHARACTERISTICS OF THE VALLEY-FILL AQUIFER IN THE WELDONA REACH OF THE SOUTH PLATTE RIVER VALLEY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
R. T. Hurr, and P. A. Schneider, Jr.
Open-file report, 1972. 2 p, 1 fig, 6 plate, 4 ref.

Descriptors: *Hydrogeology, *Aquifer characteristics, *Water wells, *Colorado, River basins, Valleys, Bedrock, Groundwater, Water table, Zone of saturation, Geomorphology, Transmissivity, Maps, Contours.
Identifiers: *South Platte River Valley (Colo), Weldona reach, Valley-fill aquifer, Stream depletion factor.

This atlas describes the hydrogeologic characteristics in the Weldona reach of the South Platte River Valley, Colorado, through 6 maps: (1) location of wells in 1968; (2) bedrock configuration beneath the valley-fill aquifer; (3) water-table contours of the valley-fill aquifer in March 1968; (4) saturated thickness of the valley-fill aquifer in March 1968; (5) transmissivity of the valley-fill aquifer; and (6) stream-depletion factor of the valley-fill aquifer. (Woodard-USGS)
W74-01142

GROUND-WATER YIELD POTENTIAL IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01147

SENSITIVITY OF GROUNDWATER FLOW MODELS TO VERTICAL VARIABILITY OF AQUIFER CONSTANTS,
Oklahoma State Univ., Stillwater. Dept. of Civil Engineering.
R. N. DeVries, and D. C. Kent.
Water Resources Bulletin, Vol 9, No 5, p 998-1005, October 1973. 4 fig, 5 ref.

Descriptors: *Hydrogeology, *Mathematical models, *Drawdown, *Water yield, Withdrawal, Aquifers, Aquifer characteristics, Water management (Applied), *Oklahoma, Groundwater movement, Permeability, Stratification, *Computer models.
Identifiers: *Ogallala aquifer (Okla).

A computer model developed for the Ogallala aquifer in the Texas Panhandle treats the aquifer as a homogeneous system. The model evaluates the effects of vertical layering on semistatic water level changes which occur during the dewatering of a single unconfined aquifer. Near Guymon, Oklahoma, the aquifer is characterized by a saturated thickness of 400 feet. The accumulated drawdown values of the homogeneous and the multilayered cases demonstrate that an average difference of approximately 22% of the original saturated thickness occurs between the two cases before the base of the aquifer is encountered. Approximately 25% more time is required to dewater the layered aquifer. Thus, vertical variations of lithology in an aquifer such as the Ogallala should be considered when prediction is made relative to groundwater management. (Knapp-USGS)
W74-01151

DRAWDOWN AT TIME-DEPENDENT FLOWRATE,
Wisconsin Univ., Milwaukee. Coll. of Applied Science and Engineering.
For primary bibliographic entry see Field 02F.
W74-01155

A DISTRIBUTED HYDROLOGICAL MODEL BASED ON THE CONCEPT OF GROUNDWATER RECHARGE, TRANSMISSION, AND DISCHARGE,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 02F.
W74-01233

GEOTHERMAL RESOURCE INVESTIGATIONS,
Bureau of Reclamation, Boulder City, Nev. Region 3.
L. R. Porter.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10136, p 2097-2111, November 1973. 13 fig, 1 tab, 7 ref.

Descriptors: *Geothermal studies, *California, Desalination, Groundwater, Heat flow, Water management (Applied), Thermal water, Water yield improvement.
Identifiers: Geothermal powerplants, *Imperial Valley (Calif).

As a major step toward augmentation of the water supply of the Lower Colorado River basin, the Bureau of Reclamation is investigating the geothermal resource potential of the basin underlying California's Imperial Valley. Multipurpose development of hot geothermal brines may produce upward of 2,500,000 acre-ft of high quality water per year, and add up to 10,000,000 kw of electrical generating capacity to Pacific Southwest power systems. Investigations to date indicate that several billion acre-ft of hot brine exist in the Imperial Valley geothermal field. When subsurface pressures are tapped by a deep well, the hot brine will flash into a mixture of steam and water. This mixture will flow to the surface and can be used to produce not only desalted water but, also, electrical power and, possibly, mineral byproducts. A deep geothermal test well, Mesa 6-1, was drilled and tested in 1972 and a portable research desalting unit installed in 1973. (Knapp-USGS)
W74-01273

NUMERICAL SOLUTION OF MULTIPHASE WELL FLOW,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Ground-Water Hydrology.
For primary bibliographic entry see Field 08B.
W74-01275

OXNARD BASIN EXPERIMENTAL EXTRACTION-TYPE BARRIER,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 08B.
W74-01289

STORAGE AND RETRIEVAL OF GROUNDWATER DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W74-01291

RECOGNITION OF NATURAL BRINE BY ELECTRICAL SOUNDINGS NEAR THE SALT FORK OF THE BRAZOS RIVER, KENT AND STONEWALL COUNTIES, TEXAS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02F.
W74-01370

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING REGION.
Aase (George) and Associates, Inc., Tallahassee, Fla.
For primary bibliographic entry see Field 06D.
W74-01481

A HYBRID MODEL FOR IRRIGATION PLANNING USING CHANCE CONSTRAINED PROGRAMMING AND HYDROLOGIC SIMULATION,
Norwegian Inst. of Urban and Regional Research, Oslo.
D. V. Smith.
International Journal of Systems Science, Vol 4, No 4, p 533-544, 1973. 2 fig, 1 tab, 3 ref.

Descriptors: *Irrigation systems, *Project planning, *Groundwater, Operation and maintenance, *Linear programming, *Stochastic processes, Water balance, Canals, Wells, Pumping, Crops, Rivers, Rainfall, Streamflow, Monte Carlo method, Surface waters, Constraints,

Aquifers, Equations, Mathematical models, Algorithms, Systems analysis.
Identifiers: *Cost minimization, *Bangladesh, Nonlinear programming.

An irrigation system consisting of a river and a groundwater aquifer from which irrigation water can be obtained and of land suitable for irrigation development is modeled to examine economic implications of alternative allocations of surface and ground waters. The planning objective is to select well and canal capacities which minimize the expected value of project costs while meeting crop water requirements, preventing excess water applications, and requiring the expected annual change in the amount of groundwater storage to be zero. Decision rules for canal diversions and well pumpages in each time period are considered functions of (stochastic) rainfall and streamflow. The formulation of reasonable decision rules is discussed and a model incorporating stochastic demands and supplies is constructed. A series of more complex decision rules is tested; for these rules, at each iteration of the algorithm a separation is made in a 'master' linear program of the effects of stochastic supplies from those of stochastic demands. The algorithm utilizes a Monte Carlo technique to adjust the 'supply and demand effects' at each iteration in accordance with the desired probabilistic relations and the optimal solutions to the previous iteration's dual problem. Results are presented for a proposed irrigation scheme in Bangladesh. (Bell-Cornell)
W74-01488

ON THE OPTIMAL OPERATION OF GROUNDWATER BASINS: A CALCULUS OF VARIATIONS APPROACH,
Illinois Univ., Urbana. Dept. of Geology.
V. V. Palciauskas, and P. A. Domenico.
Journal of Hydrology, Vol 20, (Amsterdam), p 181-189, October 1973. 5 ref.

Descriptors: *Groundwater basins, *Groundwater mining, *Storage volume, *Economic efficiency, Water supply, Resource allocation, Optimization, Equations, Mathematical models, Systems analysis.
Identifiers: *Calculus of variations, *Groundwater allocation, Benefit maximization.

The calculus of variations in employed to determine the maximum of a functional expressing the groundwater allocation problem. Emphasis is on deriving simply-structured decision rules for efficient use of groundwater basins and efficiency is interpreted as benefit maximization consistent with stability of supply. A general ordinary differential equation for the lumped parameter groundwater allocation problem is derived using variational techniques and solved by specifying either the length of a mining period or the total volume to be mined. Specifying either one of these, uniquely determines the other in terms of economic parameters entering through the benefit function. An infinite mining period sets an upper limit to the total volume to be optimally extracted and provides for the greatest economic benefit. As the mining period is shortened, the one-time exploitable volume is reduced. Although most of the calculations have been carried out for a quadratic benefit function, the detected competition between marginal productivity and the rate of interest insofar as they influence the optimal storage volume and its allocation through use rates appears to be valid in general. (Bell-Cornell)
W74-01489

SHIGELLA SONNEI ISOLATED FROM WELL WATER,
Iowa Univ., Iowa City. State Hygienic Lab.
For primary bibliographic entry see Field 05A.
W74-01551

REGIONAL WATER RESOURCES STUDIES -- A SPANISH EXPERIENCE,
Garaghty and Miller, Port Washington, N.Y.
F. van der Leeden.
Paper presented at Internation Symposium on Water Resources Planning, Mexico City, December 1972, 37 p, 9 fig, 8 ref.

Descriptors: *Groundwater, *Water supply, *Surface water, *Water resources, Subsurface water, Aquifer characteristics, Groundwater resources, Surface water availability, Groundwater availability, Resource development, Water resources development, *Regional analysis.
Identifiers: *Spain.

The Spanish government has carried out a series of unique regional hydrologic studies for the purpose of evaluating national water resources since 1968, which have proved a valuable tool in the assessment of Spain's groundwater resources and in planning, development, and management. These studies have investigated water demand, identified serious water oriented problems, estimated surface and groundwater resources available for use, identified schemes for possible water development and for solving critical water problems, and recommended additional investigations. The studies were short and intense; field work was kept to an absolute minimum and stress in placed on the evaluation of existing data. One of these studies, which examines a 25,000 sq mi. semi-arid region of Spain, is used as an example of the regional water resources analysis used in the area. (Muller-Arizona)
W74-01622

HYDROLOGICAL INFORMATION FOR THE PLANNING OF WATER RESOURCES IN DEVELOPING COUNTRIES (L'INFORMATION HYDROLOGIQUE POUR LA PLANIFICATION DES RESOURCES HYDRAULIQUES DANS LES PAYS EN VOIE DE DEVELOPPEMENT),
Office de la Recherche Scientifique et Technique OUtre-Mer, Paris (France).
For primary bibliographic entry see Field 07C.
W74-01623

UNDERGROUND STORAGE OF TEXAS PLAYA LAKE WATERS BY INJECTION INTO THE OGALLALA FORMATION UNDER MODERATE PUMP PRESSURE,
Texas Tech Univ., Lubbock.
F. B. Conselman, P. Johnson, and D. A. Crawford.
Paper presented at International Symposium on Water Resources Planning, Mexico City, December 1972, 16 p, 20 ref.

Descriptors: *Recharge, *Artificial recharge, *Injection, *Recharge wells, *Playas, Groundwater, Overdraft, Pumping, Withdrawal, Groundwater resources, Aquifers, Lake basins, Surface waters, *Texas, Storage, Groundwater recharge, Underground reservoirs.
Identifiers: *Ogallala Formation (West Texas).

An update is presented on an investigation being conducted to determine the feasibility of recharging the Ogallala Formation by injection of surface playa lake waters in the semi-arid High Plains of West Texas. Ogallala groundwater is now being mined, since there are no rechargeable outcrops to the aquifer. Runoff collects in shallow playas, since there is no well developed drainage in the area. By injection of such unused waters into the Ogallala, it is hoped to establish a method of recharging the aquifer with good quality water that would help end the need for mining the aquifer. Past studies have shown that aquifer clogging by suspended solids and colloids in playa water is a significant problem. In this study effects of injection are monitored by observation wells, with quality determinations showing playa water better than that of the Ogallala. The major result of this study is that the injection well clogging has been overcome by wells which apply moderate pump pressure and maintain sufficient fluid turbulence at aquifer entry. Flow rates have been attained near 2000 gpm and one well has successfully injected 64 acre feet of playa water at 1500 gpm at 55 surface psi. Low cost injection wells using good quality waste playa water may increase the aquifer storage in the area to a large extent while offering flood control and new drained agricultural lands. (Muller-Arizona)
W74-01627

IRRIGATION WATERS OF THE INDUS PLAINS AND THEIR SALT LOAD,
Irrigation Research Council, Islamabad (Pakistan).
For primary bibliographic entry see Field 03C.
W74-01639

4C. Effects on Water of Man's Non-Water Activities

HYDROLOGIC NUTRIENT CYCLE INTERACTIONS IN UNDISTURBED AND MANIPULATED ECOSYSTEMS (WATERSHEDS),
New Mexico Univ., Albuquerque. Dept. of Biology.
J. R. Gosz.
Available from the National Technical Information Service as PB-225 139/5, $3.00 in paper copy, $1.45 in microfiche. New Mexico State University, Las Cruces, Water Resources Research Institute, Technical Completion Report No. 031, 1973. 29 p, 5 fig, 6 tab, 11 ref. OWRR A-039-NMEX (4).

Descriptors: Ecosystems, *Watersheds (Basins), *Trees, Water chemistry, *New Mexico, Weathering, *Cycling nutrients, *Watershed management, Mountain forest, Elevation, Precipitation (Atmospheric), Temperature, Throughfall, Fir trees, Pinon pine trees, Juniper trees, Forests, Conifers, Magnesium, Calcium, Sodium, Potassium, Water pollution, *Nitrates, Cations, Anions, Climate, Minerals, Water pollution sources, Nutrients.
Identifiers: *Mineral cycling, Climatic conditions, Litterfall, Faunal, Tesuque Watershed, Cation flux, Spruce trees, Aspen.

The objectives were to understand mineral cycling and stream water chemistry of forested watersheds on New Mexico as influenced by vegetational communities, climatic conditions, weathering of soil minerals, and man. Studies to date show water quality changes over elevation, with the lowest concentrations of elements occurring at the highest elevations. This trend is consistent throughout the year; however, actual concentration values vary due to the source of water (e.g. snow melt at high or low elevations) and seasonal patterns of biological activity. Variation in concentration is greatest at lower elevations. The reasons for the higher concentrations at lower elevations are increased evapotranspiration and a combination of biological controls and bedrock weathering differences. For nitrate, variation in concentration is a result, primarily, of biological activity and climatic factors (precipitation, temperature). Research needed to identify mechanisms of biological control involve transfer of materials within the system. A limited number of these results are presented. The information gathered from natural areas is essential in evaluating man's activities. The only land use activity evaluated to date has been minor; replacing a poma ski lift on the border of a watershed. An additional loss of Ca and Mg did occur during September and October and was attributed to the construction of the new lift. Additional ski area development is currently being evaluated. (Creel-New Mexico)
W74-01110

SURFACE-WATER RESOURCES OF THE USSR AND THEIR CHANGE RESULTING FROM HUMAN ECONOMIC ACTIVITY (RESURSY POVERKHNOSTNYKH VOD SSSR I IKH IZMENENIYE POD VLIYANIYEM KHOZYAYSTVENNOY DEYATEL'NOSTI),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 04A.
W74-01133

URBANIZATION AND ITS EFFECTS ON REGIMEN AND QUALITY OF SURFACE WATERS (URBANIZATSIYA I YEYE VLIYANIYE NA REZHIM I KACHESTVO POVERKHNOSTNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. V. Kupriyanov, and B. G. Skakal'skiy.
Vodnyye Resursy, No 2, p 172-182, 1973. 2 fig, 2 tab, 28 ref.

Descriptors: *Urbanization, *Urban hydrology, *Urban sociology, *Surface waters, *Water quality, Water pollution, Water balance, Urban runoff, Cities, Foreign research.
Identifiers: *USSR.

Some aspects of the effects of urban development on regimen and quality of natural waters are considered. The effects of urbanization on water quantity and quality alterations can be determined from the changes in water balance, hydrologic regimen, and water quality in urban and suburban areas, and from the effects of cities on water balance, hydrologic regimen, and water quality of surrounding areas. Soviet and foreign data on the effects of urbanization on regimen and quality of water can be used in calculating the hydrologic and hydrochemical effects of urbanization and in studying the contemporary trend toward more intensive urban development. (Josefson-USGS)
W74-01139

TIDEWATER SHORELINES IN BROWARD AND PALM BEACH COUNTIES, FLORIDA: AN ANALYSIS OF CHARACTERISTICS AND CHANGES INTERPRETED FROM COLOR, COLOR INFRARED AND THERMAL AERIAL IMAGERY,
Florida Atlantic Univ., Boca Raton. Remote Sensing and Interpretation Lab.
For primary bibliographic entry see Field 02L.
W74-01220

4D. Watershed Protection

OBJECTIVE REGIONALIZATION OF PEAK FLOW RATES,
Agricultural Research Service, Chickasha Okla. Soil and Water Conservation Research Div.
D. G. DeCoursey.
In: Proceedings of the Second International Symposium in Hydrology, September 11-13, 1972, Fort Collins, Colorado, p 395-405, (1972). 3 fig, 6 tab, 6 ref.

Descriptors: *Regional analysis, *Floods, *Regression analysis, *Peak discharge, Watersheds (Basins), Drainage area, Precipitation, Rainfall intensity, Least squares method, Water resources, *Watershed management, *Oklahoma.
Identifiers: *Multivariate statistics, *Discriminant analysis, Stepwise regression.

Similarity of hydrologic response using discriminant analysis and an iterative algorithm was used as a basis for regionalizing 4 peak flow rates from 90 stations in Oklahoma. Sixty stations were used to develop the equations and 30 were used as a test set. Three distinct regions were obtained; however, they were not geographically contiguous. Therefore, discriminant functions using watershed characteristics as discriminators were used to define the regions. It can be shown that the intercorrelation of a group of dependent variables can be retained if the same set of independent variables is used in all equations. Therefore, since hydrologic continuity is important in the prediction of peak flow rates, all four peak rates, for each group, were predicted using linear multiple regression equations based on the same set of watershed characteristics: drainage area, mean annual precipitation, and the 2- and 100-year precipitation intensities. Peak rates of the 30 independent stations were also predicted by equations developed using conventional stepwise regression on the base set of 60 observations. Comparison of the results of the test data showed smaller standard errors of estimate and better hydrologic continuity using regionalized data and the same set of independent variables in the regression equations. (ARS)
W74-01174

HYDRODYNAMIC MODELING OF TWO--DIMENSIONAL WATERSHED FLOW,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02A.
W74-01278

COMPUTER UTILIZATION OF HYDROLOGICAL DATA FOR NORTH NASHWAAKSIS REPRESENTATIVE BASIN,
New Brunswick Univ., Fredericton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 07C.
W74-01294

DATA ACQUISITION AND STORAGE FOR RESEARCH WATERSHEDS,
Guelph Univ. (Ontario). School of Engineering.
For primary bibliographic entry see Field 07C.
W74-01295

MOHAWK LAKE STUDY, BRANTFORD, ONTARIO.
For primary bibliographic entry see Field 02J.
W74-01476

REVIEW OF PLANNING FOR THE GRAND RIVER WATERSHED.
For primary bibliographic entry see Field 05D.
W74-01478

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN. MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District. Mobile, Ala.
For primary bibliographic entry see Field 04A.
W74-01610

DESIGNATING A SEGMENT OF THE ST. CROIX AS PART OF WILD AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 06E.
W74-01619

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from National Technical Information Service as EIS-NC-72-5512-F. $4.25 in paper copy, $1.45 in microfiche. September 1972. 42 p, 1 map, 1 tab.

Descriptors: *North Carolina, *Environmental effects, *Watershed management, Multiple purpose projects, Flood prevention, Water supply, Erosion control, Flood control, Recreation, Agriculture, Water resources development.
Identifiers: *Environmental impact statement, *Robbinsville, N.C.

The Tallulah Creek Watershed (Long Creek Portion) is located in Graham County, North Carolina. Project measures include land treatment and one multiple-purpose structure for flood prevention and water supply. The project will serve to reduce soil erosion, reduce sediment delivery, reduce sediment delivery to Santeetlah Lake, reduce flood damage greatly, improve the economic and social values, provide municipal and industrial water, provide 18 acres of fishing habitat, and provide 1,806 visitor-days of recreation. Adverse environmental effects include loss of 36 acres of agricultural and forest land from production and upland game habitat, and the inundation of 4,000 feet of trout stream. Alternatives to the proposed project include the purchase of flood plain land, flood proofing, conservation land treatment, using Santeetlah Lake as an alternate source of municipal water supply, and leaving the area in its existing condition. (Mockler-Florida)
W74-01621

05. WATER QUALITY MANAGEMENT AND PROTECTION

CONCENTRATIONS OF PLUTONIUM, COBALT, AND SILVER RADIONUCLIDES IN SELECTED PACIFIC SEAWEEDS,
Scripps Institution of Oceanography, La Jolla, Calif.
K. M. Wong, V. F. Hodge, and T. R. Folsom.
Available from NTIS, Springfield, Va., 22151 as AD-741 997 for $3.00 paper copy, $1.45 microfiche. Report Nos. LA-4756, UC-41, December 1971. 6 p, 1 fig, 4 tab, 8 ref. Contract No. N00014-69-A-0200-6011.

Descriptors: *Absorption, *Marine algae, Marine animals, Radioisotopes, Cobalt, Metals, Heavy metals, Sea water, Algae, Grasses, Phaeophyta, Rhodophyta, Chlorophyta, Marine plants, Kelps, Bioindicators, *Cobalt radioisotopes, Radioactivity techniques, Analytical techniques, *Spectroscopy.
Identifiers: Co-60, Co-58, Pu-239, Ag-110m, Alpha spectrometry, Bioaccumulation, Gelidium, Macrocystis, Eisenia, Egregia, Zonaria, Sargassum, Phyllospadix, Aplysia californica, *Silver radionuclides, *Plutonium radionuclides, Sample preparation, Ashing, Biological mangification, Biological samples, Aplysia, *Seaweeds (Pacific Ocean).

The high uptake of radionuclides and the relative ease of sampling suggest that seaweeds may be ideal for monitoring certain radio-activities in the marine environment. Consequently, studies were undertaken to survey the concentrations of plutonium, radiocobalt, and radiosilver in several species of seaweeds collected along the coastal water of Southern California. Twelve species of seaweed were collected from five stations, sorted by species, washed, weighed, dried, and ashed. The ashed samples were dissolved in HNO3-HCl and Pu-236 added as a radiochemical yield monitor. The plutonium was separated and purified by anion exchange column, electroplated onto a stainless steel disk, and determined by alpha-spectrometry. From preliminary results, it was concluded that all species of seaweeds concentrate plutonium and may be a sensitive indicator for the detection of variations of plutonium concentration in the marine environment; also, further work should be done to correlate plutonium concentration between seawater and algae, and a more comprehensive survey of the marine environment is needed. By comparing samples collected near the nuclear plant with samples of the same species on

other coastal collection sites no evidence of anomalous Pua239 was found near the plant, and definite evidence was found that Co-58, Co-60 and Ag-110m had been coming from the plant. By comparing different species collected near the nuclear plant, it was found that the red algae, Gelidium and Corallina, and a surf grass, Phyllospadix, accumulate higher concentrations of cobalt and silver radionuclides than did the brown algae. One species of sea hare, Aplysia californica, that is believed to prefer red algae as food also shows higher concentrations of Co-58, Co-60 and Ag-110m. Typical concentrations were: 2200, 180, 260 dpm/kg wet sample respectively. (Little-Battelle)
W74-01297

5A. Identification of Pollutants

EVALUATION OF FLAME EMISSION DETERMINATION OF PHOSPHORUS IN WATER,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
W. R. Seitz.
Copy available from GPO Sup Doc as EP1.23:660-2-73-007, $0.50; microfiche from NTIS as PB-225 142/9, $1.45. Environmental Protection Agency, Technology Series, Report EPA-660-2-73-007, August 1973. 18 p, 4 fig, 2 tab, 18 ref. EPA RAOP 16ADN-31.

Descriptors: *Phosphorus, *Phosphates, *Flame photometry, Phosphorus compounds, Organophosphorus compounds, Inorganic compounds, Analytical techniques, *Spectrophotometry, *Pollutant identification.
Identifiers: *Flame emission spectrometry.

NUCOR's flame spectrometer for phosphorus analysis was evaluated. Response to phosphorus in the form of H3PO4 was linear from 3 micro g/liter, the detection limit, to 120 mg/liter, the highest concentration tested. Metal ions depress phosphorus emission and must be removed by cation exchange prior to analysis. High concentrations (> or equal to 5 mg/liter) of sulfur interfere positively. Volatile phosphorus compounds produce a larger signal for a given phosphorus concentration than nonvolatile compounds. River water samples were spiked with inorganic and organic phosphorus and analyzed. The measured phosphorus concentrations were 10-25% lower in river water than in deionized water. (EPA)
W74-01116

UTILIZATION OF REMOTE SENSING IN RIVER BASIN STUDIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
L. E. Link, and A. Shindala.
Water Resources Bulletin, Vol 9, No 5, p 901-907, October 1973. 8 ref.

Descriptors: *Remote sensing, *Data collections, *River basin development, Water resources, Water pollution, *Water quality, Hydrogeology, Hydrologic data, *Pollutant identification.

Remote sensing techniques have the potential for significantly reducing the level of effort in a river basin water quality study. A general methodology is proposed for conduct of river basin water quality studies. The primary advantage is rapid evaluation of the water quality conditions of a river basin. Remote sensing techniques are a fundamental part of the methodology. The proposed methodology consists of two phases. Phase I deals with the study of the water resource characteristics of the basin as a system and identification of 'critical areas'. Phase II of the methodology involves the detailed study of the critical areas by means of computerized water quality simulation models. (Knapp-USGS)
W74-01154

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY REPORTS.
For primary bibliographic entry see Field 07C.
W74-01163

ENVIRONMENT SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
L. S. Walter.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 47-56, p 47-56, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Monitoring, Environment, Path of pollutants, Data collections, Water pollution, Strip mines, Surveys, Erosion, Waste disposal.
Identifiers: *ERTS.

The spectral and spatial resolution of the ERTS-1 sensors may be used to monitor and assess specific sources of air pollution. Density slicing was used in the identification of smoke plumes. It was possible to detect previously unreported emission sources leading to possible law-enforcement applications. Smoke plumes over Lake Michigan were related to nucleation in snow showers. On a broader scale, atmospheric aerosol content and haze were studied, primarily with regard to their effect on the deterioration of signals from the earth's surface. Chemical discharge from a paper mill into Lake Champlain was detected. This information, along with numerous aircraft photographs, is being used in court by the State of Vermont to affect a cease and desist order gainst the polluter located in New York State. Differences in sediment content within rivers, bays, lakes, and reservoirs are easily discernible. It is possible to monitor the location of dumping in oceans. Rate and extent of beach erosion can be evaluated through study of coastal circulation dynamics. Strip-mine and mine-dump investigations are also described. (See also W74-01163) (Knapp-USGS)
W74-01167

PRODUCTION OF CRUSTACEAN ZOOPLANKTON IN MOTY BAY, LAKE JEZIORAK: THE METHOD OF PRODUCTION ESTIMATION,
Nicolas Copernicus Univ. of Torun, Ilawa (Poland). Dept. of Hydrobiology.
For primary bibliographic entry see Field 02H.
W74-01172

PRODUCTION OF CRUSTACEAN ZOOPLANKTON IN MOTY BAY, LAKE JEZIORAK: II. ESTIMATION OF PRODUCTION OF THE PREDOMINATING SPECIES,
Nicolas Copernicus Univ. of Torun, Ilawa (Poland). Dept. of Hydrobio!ogy.
For primary bibliographic entry see Field 02H.
W74-01173

SOME SOURCES OF ERROR IN THE 14C METHOD FOR ESTIMATING PRIMARY PRODUCTIVITY AND THEIR RELATIONSHIP TO LIGHT INTENSITY DURING INCUBATION,
Kyoto Univ., Otsu (Japan). Otsu Hydrobiological Station.
For primary bibliographic entry see Field 02H.
W74-01217

DETERMINATION OF GRISEOFULVIN BY TIME-RESOLVED PHOSPHORIMETRY,
Auburn Univ., Ala. Charles Richard Saunders Chemical Lab.
J. R. McDuffie, and W. C. Neely.
Analytical Biochemistry, Vol 54, No 2, p 507-512, August 1973,. 2 fig, 18 ref. OWRR A-017-ALA (3).

Descriptors: Pollutants, *Fungi, *Pollutant identification.
Identifiers: *Griseofulvin, *Dechlorogriseofulvin, *Fungal metabolites, Antibiotics, *Phosphorimetry, Penicillium.

Griseofulvin, an antibiotic, is a fungal metabolite produced by several species of pennicillium. Because of its use as an antibiotic, many procedures have been explored recently for the detection and determination of griseofulvin. Methods which have been used are based on glc and tlc, spectrophotometry, colorimetry and some luminescence. Of these methods, only the glc is a direct and easy way to differentiate between griseofulvin and a common contaminant, dechlorogriseofulvin. The phosphorescence lifetimes of griseofulvin and dechlorogriseofulvin are shown to be 0.11 sec and 1.16 sec, respectively. This tenfold difference is shown to enable the use of time-resolved phosphorimetry for the determination of griseofulvin in mixtures with dechlorogriseofulvin.
W74-01224

FOOD CONSUMPTION OF THE FREE-LIVING AQUATIC NEMATODE PELODERA CHITWOODI,
Auburn Univ., Montgomery, Ala. Dept. of Biology.
E. K. Mercer, and E. J. Cairns.
Journal of Nematology, Vol 5, No 3, p 201-208, July 1973. 4 fig, 4 tab, 21 ref. OWRR A-004-ALA (2).

Descriptors: *Nematodes, *Aquatic animals, Invertebrates, *Food habits, Respiration, Bacteria.
Identifiers: Calorimetry, Cartesian diver respirometer, *Pelodera chitwoodi, *Respirometers.

A Cartesian diver respirometer was used to measure 02 uptake and respiratory quotients at 25C. Respiratory quotients were about 0.70 in starved nematodes, and 0.80 in third-stage and adult nematodes that had fed on bacteria. The energy output as measured by 02 uptake was inversely related to the concentration of bacteria in the medium, indicating reduction in feeding effort. Feeding bacteria to third-stage nematodes in divers quickly resulted in peak respiration rates averaging 6.4 nl 02/micron g wet weight nematode per hour (Q02) or six times the endogenous rate. In about 4 hr, the rates fell and then stabilized at a Q02 of 2.5. Adult males fed bacteria in divers had a peak Q02 of 2.8 or twice the starved rate. Adult females fed bacteria had a peak Q02 of 3.7. Starving adult males and third-stage larvae were estimated to lose 2.4% and 1.4%, respectively, of their body weight per day in the form of fat based on the caloric equivalent of oxygen used and a respiratory quotient of 0.70. The caloric content of the bacteria fed to nematodes in divers was determined. It was then calculated that both third-stage larvae and adult males ingested bacteria equivalent to 4.4 X 0.00001 cal/micron g wet weight nematode tissue per hour when feeding. Of the bacterial calories ingested, the larvae used 27% and adults 21% for respiration. It was estimated that males ingested 3.1 X 1,000,000 bacteria and females 10 X 1,000,000 bacteria during an 8-day life span.
W74-01225

WATER. EXAMINATION. ASSESSMENT. CONDITIONING. CHEMISTRY. BACTERIOLOGY. BIOLOGY,
For primary bibliographic entry see Field 05F.
W74-01236

THE CHARACTERISTICS OF THE RAW WATERS OF HASDEO RIVER AND DHENGUR NALA AT KORBA (M. P.),
Fertilizer Corp. of India, Sindri. Planning and Development Div.
G. S. Roy, C. D. Banerjee, G. S. Bhattacharyya, and B. K. Dutta.

Technol Q Bull Plann Dev Div Fert Corp India. Vol 8, No 2, p 164-166. 1971. Illus.
Identifiers: Dhengur Nala, Hasdeo River, *India (Korba-M.P.), *Minerals, Raw waters, River, *Water treatment, Alkalinity, Dissolved solids, Demineralization, Corrosion.

Investigations on the raw surface waters in the Korba region (Madhya Pradesh, India) carried out during April 1964-March 1965 revealed that the Hasdeo river and Dhengur nala waters are very soft with very low alkalinity, sulfate, chloride and dissolved solids contents but moderately high in silica. The low mineral content of these waters had certain inherent advantages and disadvantages. The main advantage is the low cost involved in their demineralization. The primary disadvantage is their high corrosivity requiring adequate treatment with lime of alum and lime in a conventional clarifier/softener to make them suitable as industrial cooling water or for domestic use.--Copyright 1973, Biological Abstracts, Inc.
W74-01240

SOME OBSERVATIONS ON BACTERIAL POPULATIONS IN WILGREEN LAKE, MADISON, KY.,
Eastern Kentucky Univ., Richmond. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05B.
W74-01242

SURVIVAL OF COLIFORM BACTERIA IN NATURAL WATERS: FIELD AND LABORATORY STUDIES WITH MEMBRANE-FILTER CHAMBERS,
Montana State Univ., Bozeman. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 05B.
W74-01250

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-01268

TECHNIQUES FOR MEASURING LIGHT ABSORPTION SCATTERING, AND PARTICLE CONCENTRATIONS IN WATER,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07B.
W74-01283

STORAGE AND PROCESSING OF WATER QUALITY DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W74-01293

REVISIONS AND NEW TAXA IN NEW ZEALAND NOTONEMOURIDAE (INSECTA: PLECOPTERA),
For primary bibliographic entry see Field 02I.
W74-01299

VARIATION OF ORGANOCHLORINE RESIDUE LEVELS WITH AGE IN GULF OF ST. LAWRENCE HARP SEALS (PAGOPHILUS GROENLANDICUS),
Bedford Inst., Dartmouth (Nova Scotia).
R. F. Addison, S. R. Kerr, and J. Dale.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 595-600, May 1973. 1 fig, 3 tab, 13 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Pesticide residues, *Polychlorinated biphenyls, Age, Size, Chemical analysis, Variability, Insecticides, Marine animals, Mammals, DDE, DDT, Dieldrin, Pollutant identification, DDD, Statistical methods, *Gas chromatography.
Identifiers: *Harp seals, Electron capture gas chromatography, Animal tissues, Metabolites, Bioaccumulation, *Gulf of St. Lawrence, Sample preparation, Data interpretation, Pagophilus groenlandicus, Blubber, Aroclor 1254, Gas liquid chromatography.

Blubber samples from 18 harp seals taken near the Seguenay River in the Gulf of St. Lawrence were analyzed for DDT metabolites, PCBs, and dieldrin. The concentration of total DDT and metabolites (sigma DDT) ranged from 3.1 to 22.6 ppm, PCBs (as Aroclor 1254) from 2 to 22 ppm, dieldrin from 0.1 to 0.3 ppm of blubber. Rank correlation of residue level and age indicated that significant portions of the sigma DDT and PCB variance could be assigned to increased residue levels with age. Within the sigma DDT group, DDE alone showed a strong proportional increase in concentration with age. Dieldrin concentration was not appreciably correlated with age. Among factors other than age, changes in blubber thickness did not account for any significant amount of the variance in blubber residue concentration. Examination of other published data suggested that parturition and/or lactation may cause reductions in blubber residue concentrations. (Holoman-Battelle)
W74-01300

C 18-ISOPRENOID KETONE IN RECENT MARINE SEDIMENT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
R. Ikan, M. J. Baedecker, and I. R. Kaplan.
Nature, Vol 244, No 5412, p 154-155, July 20, 1973. 2 fig, 1 tab, 8 ref.

Descriptors: *Bottom sediments, Methodology, Chemical analysis, Pollutant identification, *Organic compounds, Gas chromatography, Mass spectrometry, Aquatic soils, Soil analysis, Solvent extractions, Synthesis, *California.
Identifiers: Natural organics, *Ketones, *Isoprenoids, Marine environment, *Tanner Basin (Calif), Sample preparation, 6 10 14-Trimethylpentadecan-2-one, Column chromatography, GC-mass spectrometry, Mass spectra, Thin layer chromatography, Hydrocarbons, Gas liquid chromatography.

A C18-isoprenoid ketone (6,10,14-trimethylpentadecan-2-one) has been isolated from Tanner Basin, Southern California continental shelf. Samples of sediments were sealed in glass bombs and exposed to temperatures from 60 to 150C for 7, 30, and 60 days. The sediment was then extracted with benzene-methanol and chromatographed on a silicic acid column. This compound was found in both heat-treated and untreated sediment from which it was extracted with the fatty acid fraction which had been converted to methyl esters, and was separated with the other branched components by the urea adduction method. A mass spectrum was obtained using a gas chromatograph coupled with a CEC-21-491 mass spectrometer. The identity of the ketone was further substantiated by in situ formation of a yellow 2,4-dinitrophenylhydrazone on thin-layer plates. The measured R sub F value of 0.66 was the same as for the C18-isoprenoid ketone that was synthesized. The maximum ketone yield was obtained by heating the sediment sample at 150C for one month. (Holoman-Battelle)
W74-01301

APPLICATION OF INFRARED FOURIER TRANSFORM SPECTROSCOPY TO ANALYSIS OF MICRO SAMPLES,
Dow Chemical Co., Midland, Mich. Analytical Labs.
For primary bibliographic entry see Field 02K.
W74-01303

MICRODETERMINATION OF CHLORO--S-TRIAZINES IN SOIL BY GAS-LIQUID CHROMATOGRAPHY WITH NICKEL ELECTRON CAPTURE OR ELECTROLYTIC CONDUCTIVITY DETECTION,
Hawaii Univ., Honolulu.
H. Y. Young, and A. Chu.
Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 711-713, July/August 1973. 2 fig, 2 tab, 7 ref.

Descriptors: *Triazine pesticides, *Chlorinated hydrocarbon pesticides, *Pollutant identification, *Soil analysis, Herbicides, Chemical analysis, Methodology, Pesticide residues, Solvent extraction, Soil contamination, Water pollution sources, Separation techniques, *Gas chromatography.
Identifiers: Atrazine, Propazine, Simazine, Electron capture gas chromatography, Electrolytic conductivity gas chromatography, Chemical recovery, Cleanup, Chloro-s-triazines, Selectivity, Sample preparation, Helemano soil, Kapaa soil, Hanalei soil, Gas liquid chromatography.

The method applied to the determination of chloro-s-triazine (simazine, atrazine, and propazine) residues in soil involves extraction with a mixture of ethyl acetate and methanol and analysis by gas-liquid chromatography with nickel electron capture or electrolytic conductivity detection. Cleanup is necessary for the former but not the latter detector. Sensitivity is placed at 1 ng in the injected samples the least determinable concentration at 0.1 ppm of soil. The recovery values of chloro-s-triazines added to two Hawaiian soils were 84-112 percent using the EC detector and 88-110 precent using the CD detector. The application of this method to the analysis of water and river and ocean sediments is being tested. (Holoman-Battelle)
W74-01304

TWO NEW CHYTRIDS FROM THE APPALACHIAN HIGHLANDS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
M. K. Roane.
Mycologia, Vol 55, No 3, p 531-538, May/June 1973. 14 fig, 5 ref.

Descriptors: Systematics, *Aquatic fungi, *Virginia.
Identifiers: *Chytridium ottariensis, *Phylctochytrium powhatanesis, Phycomycetes.

Two new species of the Chytridiales have been isolated from water samples from the impoundments on the Blue Ridge Scout Reservation in Pulaski County, Virginia. The first is a species of Chytridium, C. ottariensis, and the second is a Phlyctochytrium, P. powhatanensis. (Little-Battelle).
W74-01305

AUTOMATIC SAMPLERS FOR SEWAGE AND EFFLUENTS,
Oxford Sewage Works (England).
V. H. Lewin, and A. Latten.
Process Biochemistry, Vol 8, No 6, p 15-17, June 1973. 3 fig, 2 tab, 2 ref.

Descriptors: *Mechanical equipment, *Sewage effluents, *Sampling, Automatic control, Electrical equipment, Sewage, Waste water (Pollution), Reviews.
Identifiers: *Automatic samplers, Interval samplers, Proportional samplers.

A brief review is presented of available automatic samplers for sewage and effluents. These include sewage samplers, interval samples, a multipurpose sampler, a Luton type sampler, a U-tube sampler,

an impulse proportional sampler, a duckbill sampler, and others. (Little-Battelle)
W74-01306

NATURAL DISPERSION OF MERCURY FROM PUHIPUHI, NORTHLAND, NEW ZEALAND,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry.
For primary bibliographic entry see Field 05B.
W74-01307

REVISION OF FAMILY AND SOME GENERIC DEFINITIONS IN THE PHAENNIDAE AND SCOLECITHRICIDAE (COPEPODA: CALANOIDA),
New Zealand Oceanographic Inst., Wellington. Dept. of Scientific and Industrial Research.
J. Bradford.
New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1/2, p 133-152, June 1973. 4 fig, 2 tab, 58 ref.

Descriptors: *Systematics, *Copepods, *Zooplankton.
Identifiers: Scolecithrix, Amallothrix, Cornucalanus, Onchocalanus, *Phaenna, Racovitzanus, Scaphocalanus, *Scolecithricella, Scottocalanus, Xanthocalanus, Macroinvertebrates.

Some genera have been removed from the family Phaennidae which, with the Scolecithricidae, are redefined. All other genera have been placed close to the Diaixidae and Tharybidae. The scolecithricid genera Scolecithrix, Scolecithricella, Amallothrix, Scaphocalanus and Lophothrix are redefined. It is suggested that the species Scolecithrix ctenopus, S. autopecten, S. fowleri and Amallophora altera represent four groups of species which probably should be given generic status. A new species of Parundinella is named and a juvenile Neoscolecithrix described. (Little-Battelle)
W74-01308

A NEW SPECIES OF BOECKELLA (COPEPODA: CALANOIDA) FROM NORTHLAND, NEW ZEALAND,
Waikato Univ., Hamilton (New Zealand). School of Science.
M. A. Chapman.
New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1/2, p 153-157, June 1973. 2 fig, 1 tab, 3 ref.

Descriptors: *Copepods, *Systematics, Lakes, Ponds.
Identifiers: *New Zealand, *Boeckella tanea, Macroinvertebrates.

A new species of calanoid copepod, Boeckella tansa, shows similarities to B. propinqua and B. delicata. It appears to be confined to lakes and ponds in Northland, New Zealand. (Little-Battelle)
W74-01309

PROTOZOA FROM BLUE LAKE, RAOUL ISLAND,
Massey Univ., Palmerston North (New Zealand). Dept. of Microbiology and Genetics.
For primary bibliographic entry see Field 05C.
W74-01310

DIATOM FLORA OF THE GRAND RIVER, ONTARIO, CANADA,
Waterloo Univ., (Ontario). Dept. of Biology.
M. R. Sreenivasa, and H. C. Duthie.
Hydrobiologia, Vol 42, Nos 2-3, p 161-224, August 15, 1973. 224 fig, 2 tab, 23 ref.

Descriptors: *Diatoms, *Hydrogen ion concentration, Alkalinity, Sampling, Varieties, Speciation, Water quality, Aquatic plants, Sediments, Systematics, Separation techniques, Aquatic algae, *Canada.
Identifiers: *Grand River (Canada), Sample preparation, *Cymbella caespitosa.

Samples of diatom flora were collected from 12 stations on the Grand River during 1965-70. Collections were made by plankton net, by scraping rocks, and by collecting leaves of whole aquatic plants. Sediments were collected with an Ekman dredge. Samples were boiled in a mixture of nitric and sulfuric acids, washed and centrifuged with distilled water, and mounted in hyrax or clearax for microscopic examination. Of 273 taxa identified the most abundant species overall were Cymbella caespitosa and Diatoma vulgare. Most of the species identified are common to moderately alkaline rivers and lakes in eastern and central North America. (Little-Battelle)
W74-01311

FIELD AND EXPERIMENTAL STUDIES ON THE EFFECTS OF A POWER STATION EFFLUENT ON TUBIFICIDAE (OLIGOCHAETA, ANNELIDA),
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
For primary bibliographic entry see Field 05C.
W74-01312

THE DETERMINATION OF THALLIUM IN URINE AND PLASMA BY DELVES CUP ATOMIC ABSORPTION,
Illinois Univ., Urbana. Coll. of Veterinary Medicine.
G. M. Shkolnik, and R. F. Bevill.
Atomic Absorption Newsletter, Vol 12, No 5, p 112-114, September-October 1973. 4 fig, 1 tab, 8 ref.

Descriptors: *Pollutant identification, *Urine, Chemical analysis, Methodology, Metals.
Identifiers: *Plasma, *Thallium, Delves cup, *Atomic absorption spectrophotometry, Body fluids, Biological samples, Sensitivity, Reproducibility, Sample size.

A rapid and accurate method is described for determining thallium in plasma and urine utilizing Delves cup atomic absorption. Microliter quantities of plasma and urine were pipetted into decontaminated Delves cups and dried at 150C. Hydrogen peroxide was added to the plasma samples to partially oxidize the organic material; these samples were again dried after oxidation. The Delves cup method is more sensitive than that reported by previous investigators. The sensitivity for 1 percent absorption is 0.7 ng for plasma and 0.6 ng for urine when 10-microliters samples of each are analyzed. The values obtained were comparable to those obtained by flame atomic absorption. The effect of background correction is discussed. (Holoman-Battelle)
W74-01314

DETERMINATION OF MERCURY AFTER ROOM TEMPERATURE DIGESTION BY FLAMELESS ATOMIC ABSORPTION,
A. Bouchard.
Atomic Absorption Newsletter, Vol 12, No 5, p 115-117, September-October 1973. 8 tab, 7 ref.

Descriptors: *Mercury, *Pollutant identification, *Chemical analysis, *Plant tissues, *Chemical degradation, Urine, Methodology, Heavy metals, Fish, Vegetation, Organic matter, Eels, Shrimp, Leaves.
Identifiers: *Sample preparation, *Flameless atomic absorption spectrophotometry, *Animal tissues, Biological samples, Environmental samples, Tuna, Haddock, Perch oil, Anchovy, Precision, Chemical digestion.

A new method for the digestion of organic materials has been developed and used for the determination of total mercury in organic samples. This procedure, which takes place at room temperature (25C), is based on the oxidizing power of chromic acid (CrO3) alone, or combined with red fuming nitric acid. The method has been applied successfully to samples of urine, fish and vegetation. Each sample was prepared following available procedures and the proposed method. Mercury determinations by flameless atomic absorption spectrophotometry were compared in each case. The results obtained using the proposed method were comparable in all cases to the other methods used. (Holoman-Battelle)
W74-01315

EVALUATION OF THE USE OF THE HEATED GRAPHITE ATOMIZER FOR THE ROUTINE DETERMINATION OF TRACE METALS IN WATER,
State Univ., Coll., Fredonia, N.Y. Dept. of Geology.
W. M. Barnard, and M. J. Fishman.
Atomic Absorption Newsletter, Vol 12, No 5, p 118-124, September/October 1973. 7 tab, 10 ref.

Descriptors: *Trace elements, *Water analysis, Laboratory equipment, *Metals, Chemical analysis, Copper, Lead, Cadmium, Manganese, Chromium, Instrumentation, *Heavy metals, Chelation, Solvent extractions, Evaluation, Pollutant identification, Mercury, Water pollution, Methodology.
Identifiers: *Atomic absorption spectrophotometry, *Heated graphite atomizer, Sensitivity, Performance evaluation, Chemical concentration, Standard addition technique, Detection limits, Arsenic, Selenium, Graphite furnace.

Analysis of four standard reference water samples for Cu, Pb, Cd, Mn, and Cr by flameless atomic absorption spectrophotometry using a heated graphite atomizer permits an evaluation of the atomizer for the routine, practical analysis of water samples. Trace metals analysis of water by direct comparison with aqueous standards is impractical because of matrix interference. Analysis by combining a chelation and solvent extraction with subsequent atomization is effective for Cu, Pb, and Cr, but not for Cd and Mn. Analysis by standard additions appears to be reliable, but time consuming. The sensitivity of the atomizer for As, Hg, Se and certain other elements is too low for practical, routine determination of these elements in most natural waters. Although the heated graphite atomizer has high capability of sensitivity and detection limits for many elements and may have potential applications for specific problems encountered in water analysis, its use for determination of trace metals in waters of varied composition, especially by laboratories engaged in the analysis of large numbers of samples, is limited. (Holoman-Battelle)
W74-01316

A COMPARISON OF FAST DESTRUCTION METHODS FOR THE DETERMINATION OF TRACE METALS IN BIOLOGICAL MATERIALS,
Brussels Univ. (England). Pharmaceutical Inst.
S. Luyten, J. Smeyers-Verbeke, and D. L. Massart.
Atomic Absorption Newsletter, Vol 12, No 5, p 131-132, September-October 1973. 2 tab, 4 ref.

Descriptors: Methodology, *Metals, *Chemical degradation, *Copper, *Zinc, *Trace elements, Chemical analysis, Organic matter, Heavy metals, Pollutant identification, Pollutants.
Identifiers: Biological materials, *Atomic absorption spectrophotometry, Sample preparation, Biological samples, Animal tissues, Brain, Fish meal, Standard addition technique, Soluene method, Wet digestion, Pressure bottle method.

Two new procedures for the destruction of biological materials - soluene method and pressure bottle method - were applied to the determination of Cu and Zn in human brain tissue and in fish meal by atomic absorption spectroscopy. No significant differences were observed for the destruction procedures studied. Good results were obtained by the soluene method for brain tissue but the fish meal could not be dissolved in soluene. It was impossible to obtain a clear solution for brain tissue with the pressure bottle method, but it worked well in dissolving the fish meal. The soluene and pressure digestion methods do allow for fast and accurate analyses in some cases, but not all. (Holoman-Battelle)
W74-01317

A MODIFIED FILTRATION METHOD FOR THE ANALYSIS OF WASTEWATER SUSPENDED SOLIDS,
Metropolitan Denver Sewage Disposal District No. 1, Commerce City, Colo.
H. M. Harada, Jr., G. H. Reid, E. R. Bennett, and K. D. Linstedt.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1853-1858, September 1973. 2 fig, 4 tab, 3 ref.

Descriptors: *Suspended solids, *Waste water (Pollution), *Chemical analysis, *Pollutant identification, *Filtration, Methodology, Pollutants, Water analysis, Efficiencies.
Identifiers: Method evaluation, Asbestos mat, Fiber glass filter, Reproducibility, Abestos cream mat, Fiber glass disk mat.

A modified asbestos mat/fiber glass filter method has been presented for the analysis of suspended solids in wastewater process streams. A comparative evaluation was made between this method, the conventional asbestos mat, and the fiber glass disk method. From the standpoint of analytical performance the three mats compared favorably in terms of precision of measurement. All of the mats showed good reproducibility. For the raw wastewater samples, the individual samples were all within plus or minus 0.5 percent of the average for the asbestos cream mats. In all of the solids determinations, the individual results from each sample were within plus or minus 10 percent of the combined mean for all three types of filter media. Tests showed that the use of a combination filter mat facilitates considerably more rapid analysis for wastewater suspended solids than the two established methods used for comparison. With this improved analytical efficiency, there is no apparent loss of analytical accuracy. (Holoman-Battelle)
W74-01318

HEAVY METALS IN WASTEWATER AND TREATMENT PLANT EFFLUENTS,
Interstate Sanitation Commission, New York.
A. I. Mytelka, J. S. Czachor, W. B. Guggino, and H. Golub.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1859-1864, September 1973. 1 fig, 3 tab, 2 ref.

Descriptors: *Waste water (Pollution), *Heavy metals, *Sewage effluents, *Chemical analysis, *Pollutant identification, Treatment facilities, Interstate commissions, Water sampling, Water analysis, Connecticut, New Jersey, New York, Methodology, Copper, Zinc, Chromium, Lead, Iron, Nickel, Cadmium, Manganese, Mercury, Cobalt, Data storage and retrieval, Computers.
Identifiers: *Atomic absorption spectrophotometry, Data interpretation, Silver, Detection limits.

The findings are presented of the Interstate Sanitary Commission's (New York, New Jersey, and Connecticut) routine heavy metals analyses of municipal waste water treatment plants. All samples were collected by the Commission's personnel with nonmetallic equipment and stored in nonmetallic containers. The effluent and influent samples were all composite samples collected during the same 5- to 6-hr period. Concentrations of heavy metals in the waste water were determined by atomic absorption spectrophotometry. The results show that many plants receive and discharge heavy metals above prudent limits. In order to minimize the harmful effects of these heavy metals (and of those not discussed in this paper), state-of-the-art techniques must be implemented to achieve as close to 100 percent removal as possible before these metal enter the sewer system. This is especially important in the New York/New Jersey/Connecticut area, where combined sewer systems allow waste water to by-pass treatment plants and discharge, untreated, directly into the receiving waterways. (Holoman-Battelle)
W74-01319

IMPROVED DISTILLATION METHOD FOR VOLATILE ACIDS ANALYSIS,
Somerset Raritan Valley Sewerage, Somerville, N.J.
J. B. Lombardo.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1946-1951, September 1973. 1 tab, 11 ref.

Descriptors: *Distillation, Methodology, *Chemical analysis, *Pollutant identification, *Organic acids, Time, Temperature, Pollutants.
Identifiers: *Volatile acids, Precision, Repeatability, Standard methods, Chemical recovery, Acetic acid, Carbon dioxide evolution.

The direct distillation method for volatile acids given in 'Standard Methods' was studied to learn the reason for poor recovery and poor repeatability. As a result of this work, the poor recovery was attributed to hold-back of the volatile acid in the boiler and the poor repeatability to the CO2 formed. The CO2 collected in the distillate can vary widely because of temperature effects, geometry of the apparatus, and time conditions. In the standard procedure this variability affects the repeatability of the volatile acid value, because CO2 and volatile acids are analytically combined. A procedure is suggested by which both recovery and repeatability can be significantly improved. The proposed method requires less than 2 hr to carry out, gives a recovery of 97 percent, and a standard deviation of plus or minus 3.8 mg/l as acetic acid in the range of 0 to 1,000 mg/l. (Holoman-Battelle)
W74-01322

LITERATURE ON MERCURY: AVAILABILITY OF ENGLISH TRANSLATIONS,
Geological Survey, Menlo Park, Calif.
E. A. Jenne, and W. Sanders.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1952-1971, September 1973. 2 tab, 280 ref.

Descriptors: *Bibliographies, *Mercury, Publications, *Translations, Documentation, *Foreign research, *Chemical analysis, *Pollutant identification, Path of pollutants, Ecological distribution, Toxicity, Methodology, Aquatic environment, Soil environment, Mineralogy, Waste water (Pollution), Air environment, Instrumentation, Public health, Plant tissues, Chemical properties, Heavy metals, Water analysis, Geochemistry, Soil analysis, Rocks, Fish, Sediments, Metal organic pesticides, Trace elements, Birds, Crayfish, Mollusks, Human diseases, Vegetation, Mineral water, Sea water, Freshwater, Air pollution, Soil contamination, Mussels, Epidemiology, Physical properties.
Identifiers: Biotransformation, Biological samples, Marine environment, Pollutant removal, Natural waters, Organomercury compounds, Mercurials (Pesticides), Organometallics, Mercury radioisotopes, Hydrogeochemistry, Minamata disease, Pollutant effects, Carcinogenicity, Methylmercury, Alkylmercury, Phenylmercury pyrocatechol, Phenylmercury nitrate, Methylmercury nitrate, Body fluids, Seals (Animals), Eggs.

All references to published non-English language articles contained in five recent major reviews of mercury in the environment have been compiled. The availability, as of July 1, 1971, and the source of English translations is indicated in this compilation of 280 papers. Only 109 are available in English translation. A number of the references compiled are not listed in standard abstract journals and hence could not be verified. These references are primarily from the Japanese and Swedish literature. (Holoman-Battelle)
W74-01323

WASTEWATER CHARACTERIZATION OF SWEET POTATO PROCESSING,
North Carolina State Univ., Raleigh.
N. V. Colston, and C. Smallwood, Jr.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1972-1977, September 1973. 5 tab, 2 ref.

Descriptors: *Food processing industry, Waste water (Pollution), *Chemical analysis, *Water analysis, Chemical properties, Industrial wastes, Sweet potatoes, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Nitrogen, Phosphorus, Temperature, Hydrogen ion concentration, Venturi flumes, Instrumentation, Water sampling, *Pollutant identification, Solid wastes, *North Carolina.
Identifiers: *Cannery wastes, Characterization, *Sweet potato processing wastes, Unit processes, Settleable solids.

A study was conducted at a sweet potato processing plant in North Carolina during September through December 1971. The purpose of the research was to determine what waste loads were being produced in each of the unit processes throughout the cannery. The results indicated that 40 percent of the original input was yielded as saleable merchandise. Water consumption in the plant amounted to 2,600 gal/ton of raw product input (10.8 cu m/metric ton) and biochemical oxygen demand, chemical oxygen demand, total solids, and suspended solids were, respectively, 60 lb (27.2 kg), 140 lb (63.5 kg), 160 lb (72.6 kg), and 30 lb (13.6 kg) per ton (0.907 metric ton) of product produced. (Holoman-Battelle)
W74-01324

CHARACTERIZATION AND TREATABILITY OF POMACE STILLAGE,
California Univ., Davis. Dept. of Civil Engineering.
T. H. Chadwick, and E. D. Schroeder.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1978-1984, September 1973. 1 fig, 5 tab, 10 ref.

Descriptors: *California, Chemical properties, *Waste water treatment, Physical properties, *Waste identification, Sampling, Waste water (Pollution), Chemical analysis, Industrial wastes, Chemical oxygen demand, Biochemical oxygen demand, Aerobic treatment, Anaerobic digestion, Biological treatment, Suspended solids, Hydrogen ion concentration, Acidity, Nitrates, Nitrites, Phosphates, Ammonia, Nitrogen, Pollutant identification.
Identifiers: *Pomace stillage, *Winery wastes, Characterization, Distillery wastes, Loading rates, Orthophosphates, Polyphosphates, Volatile solids, Tartrates.

Washed pomace stillage from the Bear Creek Winery (California) was characterized and subjected to biological treatment and processes for solids removal. The pomace distilling material was a mixture of Tokay, Thompson, Seedless, Zinfandel, and Palomino grape skins, pulp, and seeds.

Samples were collected at 150 F and placed in plastic utility cans, lined with polyethylene bags, and frozen. Suspended solids, acidity, and pH were determined prior to freezing. Other constituents and characteristics measured were total and ammonia nitrogen, nitrate, nitrite, total phosphate, orthophosphate, polyphosphate, suspended and volatile solids, tartrate and total biological oxygen demand. The study showed that pomace stillage contains high concentrations of organic materials that can be oxidized easily under both aerobic and anaerobic conditions. A residual chemical oxygen demand of 1,000 to 2,500 mg/l existed; this was apparently nonbiodegradable. Loading rates for anaerobic digestion ranges from 0.46 to 1.38 kg/day/cu m, and acclimation over 5 to 7 days behave satisfactorily biologically, but some solids were lost in clarifiers. Chemical treatment of the stillage gave unsatisfactory effluents even at large chemical doses. (Holoman-Battelle)
W74-01325

THE IMPORTANCE OF CHELATING AGENTS IN NATURAL WATERS AND WASTEWATERS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 05B.
W74-01326

THERMOPHILIC OSTRACOD: AQUATIC METAZOAN WITH THE HIGHEST KNOWN TEMPERATURE TOLERANCE,
Oregon Univ., Eugene. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01327

CRITICAL STUDY OF THE APCD-MIBK EXTRACTION SYSTEM FOR ATOMIC ABSORPTION,
Missouri Univ., Columbia. Dept. of Agricultural Chemistry.
S. R. Koirtyohann, and J. W. Wen.
Analytical Chemistry, Vol 45, No 12, p 1986-1989, October 1973. 4 fig, 2 tab, 10 ref.

Descriptors: *Aqueous solutions, *Heavy metals, Hydrogen ion concentration, Copper, Zinc, Lead, Solvent extractions, Separation techniques, Methodology, Plant tissues, Pollutant identification.
Identifiers: *Ketones, *Carbodithioates, Solvent extraction systems, *Atomic absorption spectrophotometry, Sample preparation, *Atomic emission spectrophotometry, Organic solvents, Zn-65, Perchloric acid, Animal tissues.

A detailed study was conducted to explain the inconsistent results obtained when the APCD-MIBK extraction system was applied to complex samples such as plant or animal tissues. The aqueous phase containing sample or standard with or without radioisotope labeling was buffered with ammonium acetate and the pH adjusted to the desired value. Extractions were performed in separatory funnels shaken for 1 minute by hand. Atomic absorption and emission measurements were made on the separated organic phase. When the highest possible accuracy was required the organic phase was diluted to 10 ml with water-saturated MIBK. Atomic absorption response from metals extracted into methyl isobutyl ketone decreased as the pH of the aqueous phase prior to extraction was increased, in spite of the fact that the extraction efficiency was near 100 percent for all pH values used. The change in response was the same for copper, lead, and zinc. The difference was critically dependent on the nebulizer adjustment. The effect appears to be associated with nebulization and transport of the organic solvent to the flame, but no satisfactory explanation for the observations were found. (Holoman-Battelle)
W74-01329

NOVEL METHOD OF RAMAN DATA ACQUISITION,
Campinas Univ. (Brazil). Gleb Wataghin Inst. of Physics.
For primary bibliographic entry see Field 02K.
W74-01330

AUTOMATED RAPID SCAN INSTRUMENT FOR SPECTROELECTROCHEMISTRY IN THE VISIBLE REGION,
Naval Research Lab., Washington, D.C. Electrochemistry Branch.
For primary bibliographic entry see Field 02K.
W74-01331

CHEMICAL CONSTANTS OF METAL COMPLEXES FROM A COMPLEXOMETRIC TITRATION FOLLOWED WITH ANODIC STRIPPING VOLTAMMETRY,
North Carolina Univ., Chapel Hill. School of Public Health.
M. S. Shuman, and G. P. Woodward, Jr.
Analytical Chemistry, Vol 45, No 12, p 2032-2035, October 1973. 3 fig, 1 tab, 12 ref.

Descriptors: *Chemical analysis, *Pollutant identification, *Water analysis, Methodology, Estimating, Chelation, Cadmium, Heavy metals, Metals, *Volumetric analysis.
Identifiers: Conditional formation constants, Complexometric titration, *Anodic stripping voltammetry, *Metal complexes, *Ligands, Natural waters, Ethylenediaminetetraacetic acid, Metal chelates.

A method based solely on data obtained from a complexometric titration followed with anodic stripping voltammetry is developed which permits conditional formation constants of metal complexes to be estimated. This method was applied to ethylenediaminetetraacetic acid (EDTA) titrated with cadmium and gave a formation constant for CdEDTA that agreed well with values previously reported. It was observed that in addition to convective diffusion, chemical dissociation of the complex during pre-electrolysis contributed to stripping currents. A general diagnostic that evaluates the extent of such kinetic contributions to stripping voltammetry and that is based upon the complexometric titration is also presented. Estimation of the rate constant for dissociation of CdEDTA is made from these experiments. The method described above is a significant improvement both in accuracy and simplicity over stripping voltammetry procedures presently used for estimating formation constants of metals in natural water solutions. Both concentration of free ligands from the end point and information on chemical composition from the formation constants can be obtained from this titration. The composition of existing complexes can be inferred either from titration of the sample as received or from titrations carried out after selective and exhaustive constant potential electrolysis of a metal from solution. (Holoman-Battelle)
W74-01332

SEMIINTEGRAL ELECTROANALYSIS: SHAPES OF NEOPOLAROGRAMS,
Trent Univ., Peterborough (Ontario). Dept. of Chemistry.
M. Goto, and K. B. Oldham.
Analytical Chemistry, Vol 45, No 12, p 2043-2050, October 1973. 12 fig, 2 tab, 8 ref.

Descriptors: *Electrodes, Analytical techniques, Methodology, *Electrochemistry, Lead, Cadmium, Iron, Mercury, Nickel, Oxygen, Zinc, Gases, Heavy metals, *Metals.
Identifiers: *Semiintegral electroanalysis, Mercury electrodes, *Neopolarograms, Transfer coefficients, Rate constants, Electrode reactions, Thallium, Indium, Rare earth elements.

'Neopolarograms' are graphs vs. potential of the semiintegral of the current which flows when a stationary electrode is progressively polarized in the presence of electroactive species. Theory is presented which predicts the shapes of neopolarograms for reversible electrode processes. For irreversible and quasireversible reactions, a concise relationship exists between potential, current, and the semiintegral of the current. The theory has been verified using the electrode reactions of Tl (plus), Pb (2 plus), Cd (2 plus), In (III), Fe (II), Hg2 (2 plus), Ni (2 plus), O2, and Zn (2 plus) at a mercury electrode. These studies demonstrate the value of semiintegral electroanalysis in the determination of electron number, transfer coefficients, and rate constants of electrode reactions. Four advantages of neopolarography are enumerated. (Holoman-Battelle)
W74-01333

ANION RESPONSES AND POTENTIAL FUNCTIONS FOR NEUTRAL CARRIER MEMBRANE ELECTRODES,
North Carolina Univ., Chapel Hill. William R. Kenan, Jr. Lab. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01334

VERSATILE COMPUTER GENERATED VARIABLE ACCELERATING VOLTAGE CIRCUIT FOR MAGNETICALLY SCANNED MASS SPECTROMETERS. USE FOR ASSAYS IN THE PICOGRAM RANGE AND FOR ASSAYS OF STABLE ISOTOPE TRACERS,
Washington Univ., St. Louis, Mo. Biomedical Computer Lab.
For primary bibliographic entry see Field 02K.
W74-01335

PRACTICAL METHODS FOR DERIVATIZING AND ANALYZING BACTERIAL METABOLITES WITH A MODIFIED AUTOMATIC INJECTOR AND GAS CHROMATOGRAPH,
Center for Disease Control, Atlanta, Ga.
J. B. Brooks, C. C. Alley, J. W. Weaver, V. E. Green, and A. M. Harkness.
Analytical Chemistry, Vol 45, No 12, p 2083-2087, October 1973. 5 fig, 8 ref.

Descriptors: *Gas chromatography, Laboratory equipment, *Clostridium, *Alcohols, *Organic acids, Pollutant identification, *Pathogenic bacteria, Methodology.
Identifiers: Metabolic products, Metabolites, beta-Phenylethylamine, Tryptamine, Isoamylamine, Putrescine, Lactic acid, alpha-Hydroxybutyric acid, alpha-Hydroxyisocaproic acid, alpha-Hydroxyvaleric acid, alpha-Hydroxycaproic acid, 1-Hexanol, 2-Hexanol, 1-Heptanol, Derivation.

A Perkin-Elmer Model 900 gas chromatograph, equipped with an electron capture detector and a Hamilton Autosampler, has been modified to permit automatic injection and analysis of a variety of important bacterial metabolic products. The Autosampler was modified to correct leak problems connected with the inlet system, and a microswitch was installed to permit temperature programming. The gas chromatograph was modified by adding a Beckman switching valve that permits use of two columns (polar and nonpolar) at different time intervals through the same detector or the venting of undesirable compounds. In order to convert the Model 900 gas chromatograph equipped with an autosampler into a two-column system, an injector block through which samples could be injected manually was added to the system. The system was tested by analyzing HFBA derivatives prepared from pH10 chloroform extracts of Clostridium sordelli and C. bifermentans incubated on cooked meat and standard mixtures of acids and alcohols. (Little-Battelle)
W74-01336

INVESTIGATION OF SPECTRAL OVERLAP OF THE NEON 359.352-NM AND CHROMIUM 359.349-NM SPECTRAL LINES IN ATOMIC ABSORPTION AND ATOMIC FLUORESCENCE SPECTROMETRY OF CHROMIUM,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01337

INDIRECT COULOMETRIC TITRATION OF BIOLOGICAL ELECTRON TRANSPORT COMPONENTS,
Ohio State Univ., Columbus. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01338

SIMPLE INEXPENSIVE FREEZE-DRYING PROCEDURE,
Bureau of Alcohol, Tobacco and Firearms, Cincinnati, Ohio.
For primary bibliographic entry see Field 07B.
W74-01339

ETHYLENETHIOUREA DEGRADATION,
FMC Corp., Princeton, N.J. Niagara Chemical Div.
For primary bibliographic entry see Field 05B.
W74-01340

LATERAL DIFFUSION INTERFERENCES IN FLAME ATOMIC ABSORPTION AND EMISSION SPECTROMETRY,
Ames Lab., Iowa.
For primary bibliographic entry see Field 02K.
W74-01342

NEW DETECTOR FOR ION-EXCHANGE CHROMATOGRAPHY,
Cincinnati Univ., Ohio. Dept. of Chemistry.
T. W. Gilbert, and R. A. Dobbs.
Analytical Chemistry, Vol 45, No 8, p 1390-1393, July 1973. 4 fig, 2 tab, 11 ref.

Descriptors: *Anions, *Cations, *Heavy metals, Sodium, Potassium, Cesium, Magnesium, Calcium, Maganese, Iron, Cobalt, Nickel, Copper, Cadium, Mercury, Aluminum, Strontium, Zinc, Chromium, Fluorides, Chlorides, Bromides, Iodides, Nitrates, Sulfates, Carbonates, Laboratory equipment, Water analysis, Aqueous solutions.
Identifiers: *Ion exchange chromatography, Ion exchange membranes, Lithium, Rubidium, Silver, Barium, Cyanides, Tartrates, Citrates, Acetates, Detectors, Sensitivity, Chlorates, Bromates, Iodates, Perchlorates, Uranyl, Thicoyanates, Ammonium, Tin.

A thermomechanical analyzer is used to measure the linear dimension change in membrane length as a function of the time or effluent volume. Peak heights or areas caused by the sorption and desorption of ions are used for quantitative determinations. Cation test solutions studied were: chlorides of Li, Na, K, Rb, Cs, NH4, Et4N, Mg, Ca, Sr, Ba, Mn, Co, Ni, Cu, Cd, Hg, Sn, and Al; nitrates of Ag, Zn, and UO2; and perchlorates of Cr and Fe. Anions investigated were F, Cl, Br, I, SCN, CN, NO3, C2H302, CL03, BRO3, IO3, C104, SO4, CO3, C4H606, and C6H507. Fundamental characteristics of the cation and anion membranes used are presented. Application of the detector in the separation of both cationic and anionic species is demonstrated. (Little-Battelle)
W74-01343

FLUOROMETRIC QUANTITATION OF GALLIUM IN BIOLOGICAL MATERIALS AT NANOGRAM LEVELS,
Research Triangle Inst., Durham, N.C.
For primary bibliographic entry see Field 02K.
W74-01344

PREVENTION OF SELENIUM INTERFERENCE WITH MEASUREMENT OF PHOSPHATE AS ITS MOLYBDENUM (V-VI) COMPLEX,
New South Wales Dept. of Agriculture, Rydalmere (Australia). Biological and Chemical Research Inst.
P. J. Milham, and C. C. Short.
Journal of the Association of Official Analytical Chemists, Vol 56, No 4, p 882-885, July 1973. 2 fig, 1 tab, 8 ref.

Descriptors: *Phosphates, *Plant tissues, Measurement, Chemical analysis, Chemical degradation, Catalysts, Pollutant identification, Methodology.
Identifiers: *Selenium, *Chemical interference, *Phosphomolybdates, Complexation, Reproducibility, Selenocyanates, Sample preparation.

Selenium used as a catalyst in Kjeldahl digests of plant samples was found to interfere with an automated molybdenum blue technique for determination of phosphate. Interference was prevented by formation of selenocyanate in the presence of excess cyanide. No modification of the apparatus was required and the rate of analysis was unchanged from 40 sampler/hr. Reproducibility of the modified technique was good and results were not signigicantly different (P equals 0.01) from those obtained by a manual molybdovanadate procedure. (Holoman-Battelle)
W74-01345

NEW RECORDS OF SARGASSUM HAWAIIENSIS DOTY AND NEWHOUSE (SARGASSACEAE, PHAEOPHYTA), A DEEP WATER SPECIES,
Hawaii Univ., Honolulu. Dept. of Botany.
For primary bibliographic entry see Field 02I.
W74-01349

SUBLITTORAL BENTHIC MARINE ALGAE OF SOUTHERN CAPE COD AND ADJACENT ISLANDS: PSEUDOLITHODERMA PARADOXUM SP. NOV. (RALFSIACEAE, ECTOCARPALES),
Massachusetts Univ., Gloucester. Marine Station.
J. R. Sears, and R. T. Wilce.
Phycologia, Vol 12, Nos 1/2, p 75-82, June 1973. 15 fig, 2 tab, 11 ref.

Descriptors: *Benthic flora, *Phaeophyta, *Marine algae, *Speciation, *Cytological studies, Sampling, Systematics, Kelps, Cultures, Plant morphology.
Identifiers: *Pseudolithoderma paradoxum, Sublittoral, Sample preparation, Pseudolithoderma roscoffensis, Pseudolithoderma rosenvingii, Lithoderma, Pseudolithoderma subextensum, Pseudolithoderma extensum, Petroderma, Sorapion, Ralsia, Symphyocarpus.

Pseudolithoderma paradoxum is described as a new crustose member of the Ralfsiaceae, Ectocarpales, based on year-round observation of field collected and laboratory cultured plants. The terminal unilocular sporangia, soft character, presence of six to nine plastids in each vegetative cell, and the absence of a gel covering distinguish P. paradoxum from other brown crustose algae. (Holoman-Battelle)
W74-01350

TEMPERATURE SELECTION BY JUVENILE AND ADULT YELLOW PERCH (PERCA FLAVESCENS) ACCLIMATED TO 24 C,
Waterloo Lutheran Univ. (Ontario).
R. W. McCauley, and L. A. A. Read.
Journal of the Fisheries Research Board of Canada, Vol 30, No 8, p 1253-1255, August 1973. 1 tab, 7 ref.

Descriptors: *Perches, *Water temperature, *Bioassay, *Age, Freshwater fish.
Identifiers: *Temperature selection.

Samples of juvenile and adult yellow perch (Perca flavescens) were obtained from the same habitat and at the same time from two separate water sources to study the differences, if any, in their preferred temperatures. The fish, acclimated to 24C, were subjected to a vertical temperature gradient. Juveniles selected temperatures in the range 20.0-23.2C and adults in the range 17.6-20.1C. It is concluded that age plays an important role in temperature selection in this species. (Little-Battelle)
W74-01353

SOLVENT EXTRACTION OF METAL 1,10--PHENANTHROLINE COMPLEXES AND CONCENTRATION OF TRACE AMOUNTS OF METAL IONS PRIOR TO SPECTROPHOTOMETRIC OR FLAME PHOTOMETRIC DETERMINATION,
Northern Illinois Univ., DeKalb. Dept. of Chemistry.
A. A. Schilt, R. L. Abraham, and J. E. Martin.
Analytical Chemistry, Vol 45, No 11, p 1808-1811, September 1973. 2 fig, 3 tab, 5 ref.

Descriptors: *Ions, *Separation techniques, *Pollutant identification, *Aqueous solutions, Metals, Solvent extractions, Spectrophotometry, Flame photometry, Zinc, Iron, Water analysis, Pollutants, Anions, Nitrates, Chlorides, Lead, Cadmium, Hydrogen ion concentration, Magnesium, Titanium, Chromium, Molybdenum, Maganese, Cobalt, Nickel, Copper, Chemical analysis.
Identifiers: *Phenanthroline, Preconcentration, *Metal complexes, *Nitrobenzene, Trace levels, Organic solvents, Extraction efficiency, Sample preparation, Reagents, Complexing agents, Perchlorates, Lauryl sulfate, Lithium, Vanadium, Silver, Thallium, Tin, Bismuth, Atomic absorption spectrophotometry, Sensitivity.

The use of 1,10-phenanthroline as an extraction reagent to facilitate separation and concentration of metal ions prior to their determination has been investigated. Various solvents, anions, and solution conditions were evaluated to discover optimum conditions and procedures for quantitative extractions. Distribution ratios, extraction efficiencies, and identities of extracted complexes were determined for a number of selected metal ions. The effectiveness of 1,10-phenanthroline as an extraction reagent was demonstrated by its application to determine trace amounts of zinc and iron in water. Nitrobenzene was not only effective as an extraction solvent but also suitable as an aspiration solvent for flame spectrometry. (Holoman-Battelle)
W74-01354

SIMPLE DIRECT COMBINATION OF GAS CHROMATOGRAPHY AND VAPOR PHASE INFRARED SPECTROMETRY,
J. E. Crooks, D. L. Gerrard, and W. F. Maddams.
Analytical Chemistry, Vol 45, No 11, p 1823-1827, September 1973. 2 fig, 1 tab, 13 ref.

Descriptors: *Gas chromatography, *Laboratory equipment, *Analytical techniques, *Organic compounds, Instrumentation, Methodology, Research equipment, Chemical analysis, Spectrometers, Pollutant identification.
Identifiers: *Vapor phase infrared spectrometry, Performance evaluation, *Infrared spectra, Sensitivity, Hydrocarbons.

A combined gas chromatography/infrared spectrometry system is described which is based, as far as possible, on the equipment to be found in a smaller spectrometry laboratory, for use by staff who do not specialize in infrared spectrometry. The components of a sample are separated by gas chromatography and are passed separately into a heated multireflection gas cell. A spectrum is obtained for each component, using conventional scanning conditions, and while the spectrophotometer is running, the flow of carrier gas through the column is stopped. When the spectrum

of a particular component has been obtained, the carrier gas flow is resumed and the next component passes into the cell. Spectra may be obtained for as many as five components in one sample without seriously impairing the column resolution. Useful spectra are obtained from 100-microgram quantities of most organic compounds which, for a total sample size of 10 microliters, permits examination of components down to the 1 percent level. The system is readily assembled and the constituent gas chromatograph and infrared spectrometer may be used for other analytical work. (Holoman-Battelle)
W74-01355

DETERMINATION OF LOW CONCENTRATIONS OF COBALT IN PLANT MATERIAL BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Western Australia Univ., Nedlands. Inst. of Agriculture.
For primary bibliographic entry see Field 02K.
W74-01356

PRECOLUMN INLET SYSTEM FOR THE GAS CHROMATOGRAPHIC ANALYSIS OF TRACE QUANTITIES OF SHORT-CHAIN ALIPHATIC AMINES,
Agricultural Research Service, Fort Collins, Colo.
C. E. Andre, and A. R. Mosier.
Analytical Chemistry, Vol 45, No 11, p 1971-1973, September 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Gas chromatography, *Chemical analysis, Methodology, *Aqueous solutions, *Pollutant identification, Organic compounds, Nitrogen compounds.
Identifiers: *Aliphatic amines, *Trace levels, Linearity, Reproducibility, Sensitivity, Amines, Monomethylamine, Dimethylamine, Trimethylamine, Monoethylamine, Diethylamine, Isopropylamine, n-Propylamine, N-Butylamine, Isobutylamine, sec-Butylamine, Flame ionization gas chromatography, n-Amylamine, tert-Butylamine.

A gas chromatographic system is described that is capable of analyzing aqueous solutions of salts of short-chain aliphatic amines. A standard GC inlet modified with the Ascarite precolumn described provides the reproducibility, sensitivity, and convenience necessary for routine analyses. Because the Teflon reactor tube is easy to inspect and because it is not part of the column, routine replacement involves no more work than changing a septum. The analytical procedure which utilized a gas chromatograph equipped with a dual flame ionization detector is similar to that used for the analysis of any liquid sample. To ensure reproducibility, the precolumn inlet tubes were changed after 75 to 100 five-microliter injections. Quantitative information was obtained using peak height. Reproducibility of the system was determined using 5 and 50 ppm monomethylamine and 20 ppm isopropylamine. The relative standard deviations were respectively 3.39, 1.97, and 3.39 percent. Linearity in the 5-50 ppm working range was confirmed by a linear regression coefficient significant at the 0.1 percent level. (Holoman-Battelle)
W74-01357

A SYSTEMATIC STUDY OF THE VARIABLES INVOLVED IN THE REVERSE-PHASE THIN-LAYER CHROMATOGRAPHY OF OXYETHYLATED ALKYL SULFATE SURFACTANTS,
Beaver Coll., Glenside, Pa.
A. C. Breyer, M. Fischl, and E. J. Seltzer.
Journal of Chromatography, Vol 82, No 1, p 37-52, July 18, 1973. 7 fig, 15 tab, 26 ref.

Descriptors: *Separation techniques, *Pollutant identification, Temperature, Humidity, Methodology, Iodine, *Surfactants, *Sulfates.
Identifiers: Anionic surfactants, *Thin layer chromatography, Oxyethylated alkyl sulfates, Chromogenic reagents, Organic solvents, Adsorbents, Rhodamine B, Rhodamine 6G, Bromocresol green, Silver nitrate, Sodium fluoresceinate, Sulfuric acid, Pinacryptol yellow.

Reverse-phase thin-layer chromatography was used to separate a homologous series of oxyethylated alkyl sulfate surfactants derivable from waste animal fats. The separations were designed on the basis of a systematic study of the variation in the R sub F values and spot shapes and areas of the anionic surfactants with the major variables of the chromatographic system. The best separations were obtained with commercially available glass plates covered with a 250-microgram layer of Alumina H, Alumina G or Silica Gel G impregnated with a 3-5 percent (v/v) solution of n-dodecanol ethanol, at 15-30 degrees using tanks preequilibrated and developed with a 3:2 (v/v) methanol-ammonia solution solvent system. The use of pinacryptol yellow (0.05 percent w/v in water) together with an ultraviolet viewing chamber was found to be the most satisfactory spot detection procedure. Sample sizes of 0.1-10 micrograms in 0.5-2.0 micrograms of solution were applied with a Hamilton syringe or capillary micropipets 2 cm above the base of the plate. A 100-ml volume of solvent was added to the tanks and the solvent was permitted to run a distance of 15 cm from the spotting line. The present study lays the foundation for effecting excellent separations of other homologous series of anionic surfactants. (Holoman-Battelle)
W74-01358

EMERGENCE, REPRODUCTION, AND GROWTH OF SETIPALPIAN PLECOPTERA IN SOUTHERN ONTARIO,
Waterloo Univ. (Ontario).
P. P. Harper.
OIKOS, Vol 24, No 1, p 94-107, 1973. 23 fig, 3 tab, 20 ref.

Descriptors: *Stoneflies, *Life cycles, *Life history studies, *Reproduction, *Growth stages, Sampling, Streams, Growth rates, Hatching, Size, *Canada.
Identifiers: Emergence, Isoperla, Alloperla, Hastaperla, Perlesta, Acroneuria, Phasganophora, Paragnetina, Neoperla, Alloperia (Sweltsa).

Plecopteran nymphs were collected at monthly intervals for one year from 11 streams in southern Ontario to study their emergence, reproduction, and growth. Samples were collected from riffles by hand picking, netting, and by using emergence traps. Of 81, 372 stonefly nymphs collected, 6 207 or about 7.6 percent were Setipalpia. The Perlodidae were represented by eight species of Isoperla: I. nana, I. decepta, I. transmarina, I. clio, I. cotta, I. frisoni, I. dicala, and I. lata. Chloroperlidae were represented by two species: Alloperla (Sweltsa) onka and Hastoperla brevis. Perlidae were represented by six species: Perlesta placida, Acroneuria carolinensis, Phasganophora capitata, Paragnetina media, Neoperla clymene, and Acroeuria evoluta. Only seven species occurred in sufficient numbers to permit a study of their life cycle. Special emphasis was given in the study to the biology of the eggs, the younger nymphs, and the adults. The results show that Isoperla clio, I. transmarina, I. cotta, and I. frisoni are univoltine with a simple and straight forward life history. There is, however, in some species a differential growth of the nyphs which results in a wide siaerange of the nyphs at any one time. The chloroperlid Alloperla onkos has a two-year cycle. The perlids Paragentina media and Phasganophora capitata require three and two years respectively to complete their cycle. Pharthenogensis is reported in P. media. (Little-Battelle)
W74-01359

A PROCEDURE FOR THE ESTIMATION OF MICROGRAM QUANTITIES OF TRITON X--100,
McGill Univ., Montreal (Quebec). Dept. of Biochemistry.
H. S. Garewal.
Analytical Biochemistry, Vol 54, No 2, p 319-324, August 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Methodology, *Estimating, *Spectrophotometry, *Pollutant identification, Chemical analysis, Color reactions, Assay, Proteins, Ions, *Detergents.
Identifiers: *Trace levels, Nonionic detergents, Triton X-100, Nonionic surfactants, Chemical interferences, Octylphenoxypolyethoxyethanol.

A spectrophotometric procedure is reported for the assay of microgram amounts of the nonionic detergent Triton X-100. The method is based on the reaction of ammonium cobaltothiocyanate with the poly (ethylene oxide) groups of Triton X-100 to form a blue precipitate. The latter is extracted into ethylene dichloride and assayed spectrophotometrically. Capable of assaying as little as 40 micrograms of Triton X-100, the procedure is applicable in the presence of proteins provided a small easily determined correction is applied. High ionic strength (up to 2 M NaCl tested) did not interfere with the method. (Holoman-Battelle)
W74-01360

SIMULTANEOUS DETERMINATION OF MANGANESE, COPPER, ARSENIC, CADMIUM, ANTIMONY AND MERCURY IN GLACIAL ICE BY RADIOACTIVATION,
Naval Undersea Center, San Diego, Calif.
H. V. Weiss, and K. K. Bertine.
Analytica Chimica Acta, Vol 65, No 2, p 253-259, July 1973. 1 fig, 2 tab, 2 ref.

Descriptors: *Neutron activation analysis, *Heavy metals, *Chemical analysis, *Radioactivity techniques, *Pollutant identification, Manganese, Copper, Cadmium, Mercury, Ice, Separation techniques, Gamma rays, Irradiation, Methodology.
Identifiers: *Glacial ice, Sample preparation, *Multielemental analysis, Mn-56, Cu-64, Arsenic, As-76, Sb-122, Antimony, Hg-197, Cd-115, In-115, Chemical concentration, Detection limits, Trace levels.

A method was developed to measure simultaneously the concentration of the elements manganese, copper, arsenic, cadmium, antimony, and mercury in glacial ice. Samples and comparators were irradiated for 60 min in a thermal flux of 1.8 billion n/sq cm/s. The six elements were separated from the irradiated samples sequentially; mercury, arsenic, and cadmium received additional radiochemical purification. The gamma-rays of the Mn-56, Cu-64, As-76, Sb-122, and Hg-197 and the beta rays of the Cd-115-In-115 were measured. All the elements were detectable at the subnanogram level. Comparison of the detection limits with the concentration of elements in the samples indicated that, even with the moderate neutron flux available and for ice from a relatively uncontaminated environment, the methods used were sensitive enough for adequate characterization. (Holoman-Battelle)
W74-01361

THE DETERMINATION OF LEAD AND NICKEL BY ATOMIC-ABSORPTION SPECTROMETRY WITH A FLAMELESS WIRE LOOP ATOMIZER,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
J. V. Chauvin, M. P. Newton, and D. G. Davis.
Analytica Chimica Acta, Vol 65, No 2, p 291-302, July 1973. 6 fig, 4 tab, 32 ref.

Descriptors: *Lead, *Nickel, *Pollutant identification, Methodology, *Aqueous solutions, Optimization, Heavy metals, Anions, Cations, Temperature, Pollutants, Wavelengths, Flow rates, Gases, Absorption, Chemical analysis.
Identifiers: *Atomic absorption spectrophotometry, Flameless wire loop atomizer, Ionic interference, Sample size, Sensitivity, Detection limits, Chemical interference, Vaporization, Slit width.

In an extension of studies of flameless atomizers for atomic-absorption spectrometry, an electrically heated tungsten-rhenium alloy wire loop was examined. Reduction of metallic salts to ground-state metal atoms was accomplished with the high temperature produced by the loop. Experimental parameters such as wavelength, slit width, atomization temperature and sheathing gas flow rate were optimized. Aqueous solutions of lead and nickel were analyzed by this method using 2-microliter aliquots. Nickel was investigated as a representative less volatile metal. Absolute detection limits of 66 and 12 ng, and absolute sensitivities of 70 and 800 ng of lead, were established for unenclosed and enclosed cells, respectively. An absolute detection limit of 1.6 ng and an absolute sensitivity of 90 ng of nickel were obtained. Interference studies of lead using 20 cations and 16 anions showed that no straightforward correlation could be found between interference and any one physical property considered. Solubility problems had some effect on the anion studies especially with phosphate, sulfate, hydrogencarbonate, and acetate. Foreign cations generally enchanced the lead absorption by retarding its vaporization, allowing the slow detection system to respond more efficiently. (Holoman-Battelle)
W74-01363

EXTRACTION-PHOTOMETRIC DETERMINATION OF URANIUM (IV) WITH CHLOROPHOSPHONAZO-III,
Japan Atomic Energy Research Inst., Tokai.
T. Yamamoto.
Analytica Chimica Acta, Vol 65, No 2, p 329-334, July 1973. 3 fig, 3 tab, 9 ref.

Descriptors: *Solvent extractions, *Pollutant identification, *Spectrophotometry, Methodology, Chemical analysis, Separation techniques, Heavy metals, Chemical reactions, Cations, Anions, Alkaline earth metals, Photometry, Fluorides, Sulfates, Phosphates, Nitrates, Chromium, Copper, Iron, Time, Acidity, Stability, Molybdenum, Aluminum, Calcium, Magnesium, Chlorides.
Identifiers: *Uranium, *Metal complexes, *Chlorophosphanzo-III, Molar absorptivity, Chemical interference, Absorption spectra, Precision, Rare earth elements, Oxalates, Thorium, Zirconium, Niobium, Barium, Cerium, Lanthanum, Perchlorates.

A sensitive spectrophotometric method has been developed for the determination of uranium. The uranium (IV)-chlorophosphonazo-III complex is extracted into 3-methyl-l-butanol from 1.5-3.0 M hydrochloric acid solution. Maximal absorbance occurs at 673 nm and Beer's law is obeyed over the range of 0-15 micrograms per 10 ml of the organic phase. The molar absorptivity is 121,000 l/mole/cm. Uranium can be determined in the presence of fluoride, sulfate and phosphate. Nitrate ion and elements (chromium, copper, iron) which affect the reduction of uranium (IV) or stability of uranium (IV) interfered. The absorbance of the uranium (IV)-chlorophosphonazo-III complex in the organic phase did not change for at least 2 h at room temperature. The relative standard deviation was plus or minus 2.2 percent for 10 determinations of 10 micrograms of uranium. (Holoman-Battelle)
W74-01364

EVALUATION OF THE ACCURACY OF GRAN PLOTS BY MEANS OF COMPUTER CALCULATIONS. APPLICATION TO THE POTENTIOMETRIC TITRATION OF THE TOTAL ALKALINITY AND CARBONATE CONTENT IN SEA WATER,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W74-01365

SEPARATION OF POLYPHOSPHATES BY PAPER CHROMATOGRAPHY WITH A NEW SOLVENT,
Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Chemical Development.
T. C. Woodis, Jr., J. R. Trimm, and R. D. Duncan.
Analytica Chimica Acta, Vol 65, No 2, p 469-473, July 1973. 5 tab, 3 ref.

Descriptors: *Solvents, *Separation techniques, *Pollutant identification, *Phosphates, Hydrogen ion concentration, Temperature.
Identifiers: *Paper chromatography, Sodium tripolyphosphate, Hexammonium tetrapolyphosphate, Pentapolyphosphates, Hexapolyphosphates, Heptapolyphosphates, Octapolyphosphates, Orthophosphates, Pyrophosphates, Tripolyphosphates, Tetrapolyphosphates.

Study of the effect of solvent pH on chromatographic separation of polyphosphates led to development of a new solvent with a pH of 4. The solvent consists of 50 g of monochloroacetic acid, 250 ml of isopropanol, 350 ml of acetone, 300 ml of water, 100 ml of 25 percent EDTA solution, and 15 ml of concentrated ammonia liquor. The solvent did not give a blue front on chromatograms of sodium tripolyphosphate and hexammonium tetrapolyphosphate as did Ebel's solvent. In addition R sub F values were higher and more conveniently distributed. The new solvent has proved to be superior to Ebel's solvent since more species can be determined, hydrolysis is significantly reduced, and separations can be carried out on thinner paper and at room temperature. (Little-Battelle)
W74-01366

STATE OF RARE EARTH ELEMENTS IN SURFACE WATERS (O SOSTOYANII REDKOZEMEL'NYKH ELEMENTOV V POVERKHNOSTNYKH VODAKH),
Akademiya Nauk SSSR, Moscow. Institut Geokhimii i Analiticheskoi Khimii.
For primary bibliographic entry see Field 02K.
W74-01395

COPPER MICRONUTRIENT REQUIREMENT FOR ALGAE,
Missouri Univ., Columbia. Dept. of Chemistry.
For primary bibliographic entry see Field 05C.
W74-01398

FLUOROMETRIC DETERMINATION OF SELENIUM IN WATER WITH 2,3--DIAMINONAPHTHALENE,
New York State Dept. of Health, Albany. Div. of Lab., and Research.
J. M. Rankin.
Environmental Science and Technology, Vol 7, No 9, p 823-824, September 1973. 2 tab, 7 ref.

Descriptors: *Water analysis, *Fluorometry, *Potable water, Streams.
Identifiers: *Selenium, Sample preparation, Recovery, Precision, Chemical interference.

A simple procedure is described for determining all forms of inorganic selenium in clean water such as potable water and freshwater receiving waste effluents containing small amounts of organic matter. The method involves hydrogen peroxide oxidation to destroy organic matter and convert inorganic selenium to selenate, addition of HCl to reduce selenate to selenite and addition of 2,3-diaminonaphthalene (DAN) to form piazselenol which is extracted into cyclohexane and measured fluorometrically. Nitrate interference is removed by oxidation to nitrate and metal interferences are masked by complexation. Samples of potable water and water receiving waste effluent were spiked with selenium and analyzed with average recoveries of 101.9 and 101.7 percent. Calibration curves were linear in the range of 0.2-1.0 micrograms Se. Standard deviation of results was 6.3 percent. (Little-Battelle)
W74-01399

QUANTITATIVE ANALYSIS OF AQUEOUS NITRITE/NITRATE SOLUTIONS BY INFRARED INTERNAL REFLECTANCE SPECTROMETRY,
New York Univ., N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01402

COLLABORATIVE STUDY OF A COLORIMETRIC METHOD FOR DETERMINING ARSENIC RESIDUES IN RED MEAT AND POULTRY,
Animal and Plant Health Inspection Service, Beltsville, Md.
W. H. Buttrill.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1144-1148, September 1973. 1 fig, 2 tab, 4 ref.

Descriptors: *Colorimetry, *Chemical analysis, *Poultry, *Pollutant identification, *Hogs, Heavy metals, Methodology, Spectrophotometry, Pollutants, Chemical reactions, Color reactions.
Identifiers: *Arsenic, Animal tissues, Meat, Liver, Collaborative studies, Chemical recovery, Precision.

A colorimetric method is described for the determination of arsenic residues, which uses the molybdenum blue complex for a spectrophotometric readout. The method was studied by 9 collaborators, each analyzing 6 groups of 4 samples. Average recoveries for 0.28-2.41 ppm arsenic were 87.6-109.3 percent; standard deviations ranged from 0.037 to 0.225. The method has been adopted as official first action. (Holoman-Battelle)
W74-01403

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF CHLORPYRIPHOS IN DURSBAN INSECTICIDE FORMULATIONS,
Texas A and M Univ., College Station. Dept. of Agricultural Analytical Services.
A. R. Hanks, B. S. Engdahl, and B. M. Colvin.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1093-1095, September 1973. 1 fig, 1 tab, 15 ref.

Descriptors: *Separation techniques, *Insecticides.
Identifiers: *Gas liquid chromatography, *Chlorpyriphos, *Dursban, Precision, Sample preparation.

Chlorpyriphos can be determined in Dursban (trademark) by gas-liquid chromatography using flame ionization detection and a column packed with OV-17/QF-1 on Gas-Chrom Q. Chlorpyriphos is extracted with chloroform and dieldrin added as an internal standard. The sample is injected into a gas chromatograph and peak height measurements used for quantitative measurement. (Little-Battelle)
W74-01405

SIMPLIFIED SPECTROPHOTOMETRIC ANALYSIS OF PLANTS FOR SELENIUM,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
For primary bibliographic entry see Field 02K.
W74-01406

DISTRIBUTION OF ALKYL ARSENICALS IN MODEL ECOSYSTEM,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
For primary bibliographic entry see Field 05C.
W74-01409

RAPID GAS CHROMATOGRAPHIC METHOD FOR DETERMINATION OF RESIDUAL METHANOL IN SEWAGE,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
M. E. Fox.
Environmental Science and Technology, Vol 7, No 9, p 838-840, September 1973. 2 fig, 3 tab, 8 ref.

Descriptors: Methodology, *Chemical analysis, *Pollutant identification, *Sewage effluents, *Gas chromatography, Sewage, Organic compounds.
Identifiers: Flame ionization gas chromatography, Residual methanol, *Methanol, Sample preservation, Sample preparation, Accuracy, Precision, Repeatability, Reproducibility.

Described in a rapid and specific flame ionization gas chromatographic method for the determination of low concentrations of methanol over the range 0.5-100 ppm in sewage or other aqueous solutions. The method involves the use of direct aqueous injection gas chromatography on a porous polymer column. No preconcentration or extraction is required. Acidification of the sample at the time of collection to about pH 2 with HCl was found to inhibit completely further loss of residual methanol. Detector response to methanol was linear over a chosen range of 0.5-100 ppm. Feedstock solutions of about 25,000 ppm were found to be best analyzed by dilution to about 25 ppm. The precision (1.2 standard deviation, 2.4 percent coefficient of variation using peak heights) of the method was determined from replicate analyses (10) of a sewage effluent sample containing 50 ppm methanol. The analysis time of approximately 1 min/sample makes the procedure especially suited to process control applications. (Homoman-Battelle)
W74-01410

METABOLISM AND BILIARY EXCRETION OF SULFOBROMOPHTHALEIN BY RAINBOW TROUT (SALMO GAIRDNERI),
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 05C.
W74-01411

UPTAKE OF METHYL MERCURIC CHLORIDE AND MERCURIC CHLORIDE BY TROUT: A STUDY OF UPTAKE PATHWAYS INTO THE WHOLE ANIMAL AND UPTAKE BY ERYTHROCYTES IN VITRO,
Michigan State Univ., East Lansing. Dept. of Physiology.
For primary bibliographic entry see Field 05C.
W74-01412

CRITERIA FOR MYCOTOXIN STANDARDS,
Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics.
J. V. Rodricks.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1290-1291, September 1973. 5 ref.

Descriptors: Standards, Analytical techniques.
Identifiers: *Analytical standards, *Purity, *Aflatoxin M1, *Mycotoxin standards.

Since the quality of analytical standards affects results of analyses, it is recommended that mycotoxin standards meet prescribed criteria of purity and that methods be available for analysts to check the concentration and purity of these standards. Criteria should include source of the compound and method of isolation, method of purification and criteria of purity and stability. A procedure for the determination of the concentration and purity of aflatoxin M1 standards which was used in a collaborative study by the International Union of Pure and Applied Chemistry is recommended. (Little-Battelle)
W74-01414

MODIFIED DELVES CUP ATOMIC ABSORPTION DETERMINATION OF LEAD IN BLOOD,
Center for Disease Control, Atlanta, Ga.
W. F. Barthel, A. L. Smrek, G. P. Angel, J. A. Liddle, and P. J. Landrigan.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1252-1256, September 1973. 5 tab, 13 ref.

Descriptors: *Lead, *Chemical analysis, *Pollutant identification, Heavy metals, Methodology, Pollutants, Sheep, Goats, Cattle.
Identifiers: Delves cup method, *Atomic absorption spectrophotometry, *Blood, *Animal tissues, Serum, Blood plasma, Bovine serum, Humans.

A modification of the Delves atomic absorption micro method for blood lead determinations is presented. The principal differences between the present modification and the original Delves method are the improvement in hardware to overcome problems is reproducibility and a char method to essentially eliminate the smoke peak which normally causes serious interference. The method has been applied to several different types of blood samples with excellent results. (Holoman-Battelle)
W74-01415

HERBICIDE ANALYSIS: RELATIONSHIP BETWEEN MOLECULAR STRUCTURE AND RETENTION INDEX,
Department of the Environment, Burlington (Ontario). Inland Waters Branch.
R. H. Larose, and A. S. Y. Chau.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1183-1187, September 1973. 6 tab, 8 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, 2 4-D, 2 4 5-T, Molecular structure.
Identifiers: *Retention time, *Gas liquid chromatography, *Esters, Silvex, 2 4-DB, 2 4 6-T, Retention index, Sample preparation.

Five chlorophenoxy acids, 2,4-D, 2,4,5-T, silvex, 2,4-DB, and 2,4,6-T, were esterified with methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, tert-butanol, and 2-chloroethanol to investigate the retention times of the esters on three different GLC columns. A linear relationship was found between the logarithm of the retention time of a series of esters of a particular chlorophenoxy acid and the number of carbon atoms in the alcohol used for esterification, provided the alcohols were part of a homologous series. This relationship can be used to predict the retention time of an ester without having to synthesize it. It is also possible to predict which alcohol will yield esters with retention times different from those of co-extractive peaks and which will yield esters which can best be separated by the particular chromatographic system. The total retention index is divided into three additive components: the alcohol, the acid, and the interaction contributions. (Little-Battelle)
W74-01416

DETERMINATION OF CHLORINATED PESTICIDES IN WHOLE BLOOD,
Iowa State Univ., Ames. Veterinary Diagnostic Lab.
P. E. Stretz, and H. M. Stahr.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1173-1177, September 1973. 4 tab, 6 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Dieldrin, Methodology, *Pollutant identification, Insecticides, *DDT, Chemical analysis, Statistical methods, *Gas chromatography.
Identifiers: *Blood, Electron capture gas chromatography, Quantitative analysis, p p' DDT, *Lindane, Biological samples, Sample preparation, Data interpretation, Collaborative studies, Body fluids, Gas liquid chromatography.

Eight whole blood samples spiked with lindane, dieldrin, and p,p'-DDT at levels of 2.5, 12.6, 126, and 630 ppb each were sent to 11 collaborators for analysis. The method evaluated uses sulfuric acid to liberate the pesticides from the blood matrix. The pesticides are then extracted with 10 percent acetone in hexane. Pesticides were identified and quantitatively analyzed by gas-liquid chromatography using an electron capture detector. Mean values at all levels are in good agreement with the spiking levels. However, statistical analysis of the data reveals a large systematic error. Further evaluation of the sulfuric acid method by comparison with other methods is recommended. (Holoman-Battelle)
W74-01417

DETERMINATION OF MELEIC HYDRAZIDE RESIDUES IN TOBACCO AND VEGETABLES,
Department of Agriculture, Ottawa (Ontario). Chemistry and Biology Research Inst.
M. Inhat, R. J. Westerby, and I. Hoffman.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1164-1172, September 1973. 7 fig, 4 tab, 19 ref.

Descriptors: *Plant growth regulators, *Pollutant identification, Methodology, *Chemical analysis, Plant tissues, *Tobacco, *Vegetable crops, Distallation, Spectrophotometry, Plant growth, Agronomic crops, Water pollution sources, Potatoes, Carrots.
Identifiers: *Maleic hydrazide, Chemical recovery, Precision, Sensitivity, Detection limits, 1 2-Dihydropyridazone-3 6-dione.

The distillation-spectrophotometric method of Hoffman for determining maleic hydrazide has been modified to include a double distillation and was applied to the determination of 1-30 ppm maleic hydrazide residues in tobacco and vegetables. Recoveries of 1-23 micrograms added maleic hydrazide were independent of weight of maleic hydrazide, but did depend on sample and sample weight. The following recoveries were obtained from 0.5 g sample: pipe tobacco, 84 percent; commercially dehydrated potato, 83 percent; cigar tobacco, 81 percent; dried potato, 76 percent; fluecured tobacco, 73 percent; dried carrot, 71 percent. In the absence of sample, the recovery was 82 percent. When appropriate standard curves were used, maleic hydrazide levels determined in tobacco samples were essentially independent of sample weight in the range 0.1-3 g. The means relative standard deviation for a variety of field-treated and fortified tobacco samples containing 1-28 ppm maleic hydrazide was 3 percent. The precision and sensitivity of this procedure seem to be substantial improvements over official method 29.111-29.117. It is recommended that the present method be subjected to a collaborative study. (Holoman-Battelle)
W74-01418

AN OXYGEN ELECTRODE MICRORESPIROMETER,
Newcastle-upon-Type Univ. (England). Dept. of Zoology.

H. J. Atkinson, and L. Smith.
Journal of Experimental Biology, Vol 59, No 1, p 247-253, August 1973. 2 fig, 15 ref.

Descriptors: *Nematodes, *Oxygen requirements, Laboratory equipment, Calibrations, Respiration, Oxygen demand, Bioassay, Cultures.
Identifiers: Enoplus brevis, *Respirometers, Detection limits, *Membrane electrodes, Macroinvertebrates.

Ocygen consumption of individual small organisms (60-380 micrograms body weight) such as nematodes can be measured using a Clark-type oxygen electrode. The apparatus consists of the electrode within a stainless steel housing which is surrounded by a constant-temperature water jacket. The membrane of the electrode forms part of an enclosed chamber which holds the animal to be tested. The chamber can be sealed and a magnetic stirrer reduces the diffusion gradient between the animal and the electrode. The procedure for calibrating the respirometer is described. In tests with marine mematodes, Enoplus brevis, oxygen consumption ranges from 0.135 to 0.036 cu mm/hr. The procedure is accurate and reliable for measurements of 0.02-0.2 cu mm/hr. (Little-Battelle)
W74-01419

AN IMPROVED METHOD OF CELL ENUMERATION FOR FILAMENTOUS ALGAE AND BACTERIA,
Medical Coll. of Ohio, Toledo. Dept. of Microbiology.
J. C. Burnham, T. Stetak, and J. Boulger.
Journal of Phycology, Vol 9, No 3, p 346-349, September 1973. 2 fig, 10 ref.

Descriptors: Population, *Algae, Bacteria, Statistical methods, Cultures, Microscopy, Cyanophyta.
Identifiers: *Cell counts, *Filamentous algae, *Filamentous bacteria, Phormidium luridum, Accuracy.

Cells of filamentous algae and bacteria can be simply counted by applying a drop from the shaken culture to a 400 square grid of a Petroff-Hausser Bacterial Counting Chamber, applying a coverslip, and counting cells in 10 selected squares under a microscope (number of cells is termed C). In addition, the grid is organized into 25 blocks of 16 squares per block, and 15 of these blocks are examined. The total number of squares containing any part of a filament is termed B. The mean number of cells per chamber square can then be calculated as CB/2400. The total count can be determined using the conversion from cells per square to cells per milliliter. Statistical analysis of results with Phormidium luridum var. olivacea and comparsion with other methods showed that the method is useful for routine cell enumerations. (Little-Battelle)
W74-01421

THE EFFECTS OF BACTERIA ON THE GROWTH AND REPRODUCTION OF OEDOGONIUM CARDIACUM,
California Univ., Berkeley. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-01422

OBSERVATIONS ON THE ECOLOGY OF LAMINARIA SINCLAIRII ON THREE NORTHERN OREGON BEACHES,
Arch Cape Marine Labs., Oreg.
For primary bibliographic entry see Field 05C.
W74-01423

MODIFICATIONS IN FILTRATION METHODS FOR THE MEASUREMENT OF INORGANIC C--14 UPTAKE BY PHOTOSYNTHESIZING ALGAE,
Kinnerat Limnology Lab., Tiberias (Israel).
T. Berman.
Journal of Phycology, Vol 9, No 3, p 327-330, September 1973. 1 fig, 4 tab, 16 ref.

Descriptors: *Filtration, *Carbon, Absorption, *Photosynthesis, *Primary productivity, *Phytoplankton, Separation techniques, Radioactivity techniques, Cultures.
Identifiers: Errors, Sample preparation, *Lauderia, *Gonyaulax polyedra.

In the course of routine primary productivity experiments with phytoplankton, the filtration step may introduce errors into the determination of inorganic C-14 uptake into particulate and filtrate organic fractions. However, when ultrafine glass fiber filters, low filtration pressures, and fuming over HCl were used, and corrections made for nonbiological adsorption of radioactivity on filters, no significant changes of cpm retained on filters per milliliter of filtration volume were found in tests with various algal populations. Cultures of Lauderia sp. and Gonyaulax polyedra, when photosynthesizing in 1 compartment of a 2-chambered diffusion apparatus, released similar amounts of radioactive dissolved organic compounds measured after diffusion or upon filtration. Under our conditions, only negligible amounts of dissolved organic compounds were retained by filters. For many natural waters, therefore, these filtration techniques permit adequate accuracy for primary productivity measurements. (Little-Battelle)
W74-01425

ELECTROPHORETIC AND IMMUNOLOGICAL ANALYSES OF SEVEN CHLOROSARCINACEAN ALGAE,
Louisiana State Univ., New Orleans. Dept. of Biological Sciences.
D. L. Thomas, and R. D. Groover.
Journal of Phycology, Vol 9, No 3, p 289-296, September 1973. 10 fig, 1 tab, 34 ref.

Descriptors: *Chlorophyta, *Biological properties, *Chemical analysis, Enzymes, Aquatic algae, Systematics, Biochemistry, Proteins, Pollutant identification, *Electrophoresis.
Identifiers: *Chemotaxonomy, *Biochemical characteristics, Starch gel electrophoresis, Disc gel electrophoresis, Serology, Immunology, Culturing techniques, Malate dehydrogenase, Glutamate dehydrogenase, Leucine aminopeptidase, Peroxidase, Chemical concentration, Alpha esterases, Benzidine, Pyrogallol.

Proteins from 7 species of chlorosarcinacean algae representing 4 genera were studies with starch and disc gel electrophoresis and immunology to determine biochemical relationships. Migration patterns of enzymes and serological reactions indicated that 4 species of Chlorosarcinopsis were closely related, whereas Friedmannia israeliensis, Fasciculochloris boldii, and Chlorosarcina longispinosa were more diverse. Malate dehydrogenase, glutamate dehydrogenase, nonspecific alpha esterases, and peroxidase (using pyrogallol as the hydrogen donor) were present in all 7 species. No peroxidase activity occurred with benzidine. Leucine aminopeptidase was obvious in only 2 species. A single distinct band of general protein in F. israeliensis and C. longispinosa suggested the presence of homogenous reserve protein. The 7 species exhibited serological affinity to 4 isolates of Protosiphon representing diverse morphology within the genus. The data are discussed relative to current knowledge of comparative morphology of chlorosarcinacean algae. (Holoman-Battelle)
W74-01426

SOME THOUGHTS ON NUTRIENT LIMITATION IN ALGAE,
Dunstaffnage Marine Research Lab., Oban (Scotland).
For primary bibliographic entry see Field 05C.
W74-01428

ALGAL SUCCESSION ON ARTIFICIAL REEFS IN A MARINE LAGOON ENVIRONMENT IN GUAM,
Guam Univ., Agana. Marine Lab.
For primary bibliographic entry see Field 05C.
W74-01429

DIATOM ASSOCIATIONS IN YAQUINA ESTUARY, OREGON : A MULTIVARIATE ANALYSIS,
Oregon State Univ., Corvallis. Dept. of Botany.
For primary bibliographic entry see Field 05B.
W74-01430

RELIABILITY OF AN AMMONIA PROBE FOR ELECTROMETRIC DETERMINATION OF TOTAL AMMONIA NITROGEN IN FISH TANKS,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inti.
J. Barica.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1389-1392, September 1973. 3 fig, 1 tab, 4 ref.

Descriptors: *Ammonia, Water analysis, *Calibrations, Electrodes, Aquaria.
Identifiers: *Gas-membrane electrodes, *Sample preparation, Detection limits, Precision, Ammonia-nitrogen, Membrane electrodes, Calibration curves.

The Orion ammonia electrode model 95-10, which is a gas sensing probe, was evaluated for determining total ammonia nitrogen in fish tanks. The probe senses ammonia which diffuses through a hydrophobic gas-permeable membrane until the partial pressure is the same on both sides of the membrane. Since the probe senses only ammonia gas, it is necessary to raise the pH of the test solution to 12-13 to convert NH (plus) to the unionized form by adding NaOH. At low levels of NH3-N found in aquaria (0.3-2 mg/1) the probe response does not follow the Nernstian equation. Therefore, it is necessary to construct calibration curves using fresh aquarium water for greatest accuracy. The probe response stabilizes after about 5 minutes at low levels (about 1 mg/1) of ammonia. Comparison of probe results with those obtained spectrophotometrically showed that the probe was unsuitable below 0.1 mg/1 and gave values differing by plus or minus 17 percent in the range 0.2-0.5 mg/1. (Little-Battelle)
W74-01433

GROWTH RATES OF INTERTIDAL MOLLUSCS AS INDICATORS OF EFFECTS OF UNEXPECTED INCIDENTS OF POLLUTION,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 05C.
W74-01434

BEHAVIORAL RESPONSES TO CHANGES IN HYDROSTATIC PRESSURE AND LIGHT DURING LARVAL DEVELOPMENT OF THE LOBSTER HOMARUS GAMMARUS,
Marine Biological Station, Port Erin, Isle of Man (England).
For primary bibliographic entry see Field 05C.
W74-01436

AN AUTOMATED METHOD FOR THE DERTEMINATION OF TRACE AMOUNTS OF METAL IONS BY ION-EXCHANGE CHROMATOGRAPHY. DETERMINATION OF ZINC (II) IN WATERS,
Government Industrial Research Inst., Nagoya (Japan).
H. Matsui.
Analytica Chimica Acta, Vol 66, No 1, p 143-146, August 1973. 1 fig, 3 tab, 9 ref.

Descriptors: *Zinc, *Water analysis, Methodology, *Colorimetry, Chemical analysis, Cations, Heavy metals, Automatic control, Sea water, Municipal water, Groundwater, Potable water, *Trace elements.
Identifiers: Natural waters, *Ion exchange chromatography, Trace levels, Zincon, Chromogenic reagents, 2-Carboxy-2'hydroxy-5'sulfoformazylbenzene, Precision, Shonai-gawa River, Yadagawa River, Ise Bay, Chemical interference, Ionic interference.

An automated method for the determination of trace amounts of zinc- (II) by ion-exchange chromatography and colorimetry is described; zinc is determined colorimetrically with zincon, 2-carboxy-2'-hydroxy-5'-sulfoformazylbenzene. In the proposed method, 2.0-15.0 micrograms of zinc can be determined without interference and with a maximum error of 3 percent. In applications of this method, the zinc content of several kinds of water was determined. Zinc was adsorbed quantitatively from water containing the same amounts of these ions as seawater, acidified to 4 percent acetic acid. (Holoman-Battelle)
W74-01438

THE DETERMINATION OF ORGANO-SULFUR COMPOUNDS BY THIN-LAYER CHROMATOGRAPHY VIA A LIGAND-EXCHANGE PRECESS,
Dalhousie Univ., Halifax (Nova Scotia). Trace Analysis Research Center.
R. W. Frei, B. L. MacLellan, and J. D. MacNeil.
Analytica Chimica Acta, Vol 66, No 1, p 139-142, August 1973. 2 tab, 5 ref.

Descriptors: *Chemical analysis, *Separation techniques, *Pollutant identification, *Sulfur compounds, Organic compounds, Fluorescence.
Identifiers: *Organosulfur compounds, *Ligand exchange method, Quantitative analysis, Palladium chloride-calcein reagent, Thin layer chromatography, Detection limits, Accuracy, Precision, Chromogenic reagents, Reproducibility, Method evaluation, Palladium, Calcein, 2-Benzimidazolethiol, 5-Benzol-2-thiohydantoin, 2-Mercaptobenzoic acid, Thioacetamide, 2-Mercaptobenzothiazole, Mercaptosuccinic acid, 2-Thiobarbituric acid, Thiocarbanilide, Thioglycollic acid, Thiourea.

The palladium chloride-calcein spray reagent may be used for the detection of many sulfur-containing compounds after separation on thin-layer chromatograms. Palladium forms stable complexes with sulfur in certain oxidation states, thus releasing the calcein with which it had been complexed. The sulfur-containing compounds investigated were detected by the fluorescence of the free calcein. Maximum fluorescence intensity was observed 15-60 min after spraying with a gradual loss in intensity over 15 h. The quantitative application of the method was investigated for thioacetamide and the results showed that thioacetamide could be determined semiquantitatively at the visual detection limit (10 ng/spot) with acceptable precision and accuracy. All results obtained indicate that the method has excellent possibilities for development as a routine technique. (Holoman-Battelle)
W74-01439

STUDY OF CHELATED MIXTURES OF FERRIC IONS WITH NITRILOTRIACETIC, SULFO--5-SALICYLIC AND PYROCATECHOL-3,5-DISULFONIC ACIDS, (IN FRENCH),
M.Morin, and J. P. Scharff.
Analytica Chimica Acta, Vol 66, No 1, p 113-121, August 1973. 3 fig, 2 tab, 28 ref.

Descriptors: *Iron, *Nitrilotriacetic acid, *Pollutant identification, Chelation, Cations, Heavy metals, *Organic acids, Methodology, *Sulfur compounds.
Identifiers: Sulfo-5-salicylic acid, Pyrocatechol-3 5-disulfonic acid, Mixtures, *Metal chelates, Potentiometry, Tristimulus colorimetry, Stability constants, Chelating agents.

A detailed examination of mixed chelate formation in systems containing iron (III), nitrilotriacetic acid, and 5-sulfosalicylic acid or pyrocatechol-3,5-disulfonic acid, has been made. Precise stability constants for the iron (III)-nitrilotriacetic acid system were established. Potentiometric methods and tristimulus colorimetry were used to establish mixed chelate formation. The compositions and stability constants of all the species formed are given. (Holoman-Battelle)
W74-01440

THE DETERMINATION OF CADMIUM BY ATOMIC ABSORPTION IN AIR, WATER, SEA WATER AND URINE WITH A R.F. CARBON BED ATOMIZER,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
J. W. Robinson, D. K. Wolcott, P. J. Slevin, and G. D. Hindman.
Analytica Chimica Acta, Vol 66, No 1, p 13-21, August 1973. 7 fig, 2 tab, 11 ref.

Descriptors: *Cadmium. Air, *Water analysis, Methodology, *Chemical analysis, *Pollutant identification, Heavy metals, Sea water, Freshwater, Urine, Aqueous solutions, Water pollution, *Air pollution.
Identifiers: *Atomic absorption spectrophotometry, Biological samples, Detection limits, Absorbance, Perchlorates, Borates, Ionic interference, Chemical interference, Carbon bed atomizers, Sensitivity.

The analytical parameters are described for the determination of cadmium by atomic absorption in air, water, seawater, and urine. The technique involves the use of an R. F. generator which heats up a carbon bed to approximately 1400 degrees. The sample is reduced to free metal atoms and is analyzed directly afterwards. The atomization step and the measuring step are separate steps in this procedure. Detection limits of 0.1 pg were reached. Quantitative analyses were carried out on the types of samples indicated. Chemical interferences were studied with a 100-fold excess of the interfering ion. No interference was noted; a slight depression of the absorption signal was noted in the presence of perchlorate, and a more severe (30 percent) depression of signal was noted when borate was present. Absorption traces were compared for Cd in drops injected directly onto the carbon bed and for Cd solution introduced using carbon slivers. The Cd concentrations were the same in both cases; the results showed the direct drop technique to be more sensitive than the carbon sliver technique. (Holoman-Battelle)
W74-01441

THE POTENTIOMETRIC TITRATION OF POTASSIUM IN SEA WATER WITH A VALINOMYCIN ELECTRODE,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
T. Anfalt, and D. Jagner.
Analytica Chimica Acta, Vol 66, No 1, p 152-155, August 1973. 1 tab, 13 ref.

Descriptors: *Potassium, *Sea water, *Water analysis, *Volumetric analysis, Alkali metals, Pollutant identification, Salinity, Methodology, Cations, *Electrodes.
Identifiers: *Potentiometric titration, Valinomycin electrode, Precision, Ion selective electrodes.

The valinomycin electrode was investigated to determine if it could be used for highly precise determinations of potassium. Using Standard Sea Water, the potassium concentration was determined, from 97 titrations in which freshly prepared electrodes were used for approximately every tenth titration, to be 10.22 plus or minus 0.03 mmole/100 g of seawater. The relative standard deviation for a single titration is not, however, better than 0.026. (Holoman-Battelle)
W74-01442

COMPUTER IDENTIFICATION OF BACTERIA ON THE BASIS OF THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERNS,
National Institutes of Health, Bethesda, Md. Clinical Pathology Dept.
R. Friedman, and J. MacLowry.
Applied Microbiology, Vol 26, No 3, p 314-317, September 1973. 3 tab, 10 ref.

Descriptors: *Computer programs, *Pollutant identification, *Pathogenic bacteria, *Enteric bacteria, *Antibiotics (Pesticides), *Mathematical models, Pseudomonas, Salmonella, Streptococcus, E. coli.
Identifiers: Sensitivity, Accuracy, Selective media, Staphylococcus, Klebsiella, Proteus, Serratia, Enterobacter, Citrobacter, Bacteroides, Haemophilus, Herellea, Bacillus, Providence.

A computer program utilizing a Baysean mathematical model was developed to identify bacteria solely on the basis of their antibiotic sensitivities. The model contains probability data on the antibiotic sensitivity patterns of 31 species of bacteria of the following genera: Staphylococcus, Pseudomonas, Klebsiella, Escherichia, Proteus, Streptococcus, Enterobacter, Serratia, Citrobacter, Bacteroides, Haemophilus, Bacillus, Salmonella, and Providence. During a 4-month test period, antibiotic sensitivity data on 1,000 clinical isolates were processed by the program. The identification achieved by using the model was the same as that of the laboratory for over 86 percent of the isolates. (Little-Battelle)
W74-01443

SAND BEACH BACTERIA: ENUMERATION AND CHARACTERIZATION,
American Univ., Beirut (Lebanon). Dept. of Biology.
H. M. Khiyama, and J. C. Makemson.
Applied Microbiology, Vol 26, No 3, p 293-297, September 1973. 1 fig, 5 tab, 17 ref.

Descriptors: *Connate water, *Sands, *Separation techniques, *Cultures, Seashores, Temperature, Hydrogen ion concentration, Biochemistry, Fermentation, Enzymes, Microscopy, Beaches, Marine bacteria.
Identifiers: Characterization, Culture media, Sample preparation, Motility, Voges-Proskauer reaction, *Lebanon (Sinbad Beach), Biochemical tests, Enumeration.

Sand and interstitial water from Sindbad Beach, 30 km south of Beirut, Lebanon, were collected for enumeration of bacteria and for determination of biochemical, morphological, and cultural characteristics of several hundred individual strains. Total counts were determined by placing small samples in screw-cap tubes, adding peptone, shaking, plating a sample from the tube on peptone-yeast extract medium. Interstitial bacteria were collected with interstitial water samples suctioned through an HA-Millipore filter. PYE broth was then added to the absorbant pad below the membrane. Bacteria from sand and water were counted using the microscope after suctioning through Millipore filters and fixing and staining with erythrosin in aqueous phenol. Additional tests included sugar fermentation, hydrolysis of gelatin and starch, Voges - Proskauer reaction, indole production, motility, catalase, oxidase, flagellar stain, ability to grow aerobically on single carbon sources, and ability to grow at various temperatures and pH values. The number of interstitial bacteria was estimated to be a significant fraction of the total number of bacteria present. Three hun-

dred sixty-two strains were isolated and submitted to the cultural and biochemical tests. Fermentational abilities and the production of indole suggested that a significant number of these bacteria were symbiotically associated with resident metazoans. (Little-Battelle)
W74-01444

SMALL-VOLUME SOLID-ELECTRODE FLOW--THROUGH ELECTROCHEMICAL CELLS. PRELIMINARY EVALUATION USING PULSE POLAROGRAPHIC TECHNIQUES,
Hoffmann-La Roche, Inc., Nutley, N.J. Animal Health Research.
For primary bibliographic entry see Field 07B.
W74-01445

SOLUBLE ALUMINUM IN MARINE AND FRESH WATER BY GAS-LIQUID CHROMATOGRAPHY,
Alaska Univ., College. Inst. of Marine Science.
M-L. Lee, and D. C. Burrell.
Analytica Chimica Acta, Vol 66, No 2, p 245-250, September 1973. 5 fig, 17 ref.

Descriptors: *Sea water, *Aluminum, *Freshwater, *Pollutant identification, Chemical analysis, Water analysis, Heavy metals, Separation techniques, Solvent extractions.
Identifiers: Natural waters, *Gas liquid chromatography, Metal chelates, Trifluoroacetylacetone, Partition chromatography, Electron capture gas chromatography, Aluminum trifluoroacetylacetonate, Sample preparation.

The feasibility of determining the extractable aluminum contents of natural waters, with particular emphasis on seawater, by gas-liquid partition chromatography has been demonstrated. The metal is chelated with trifluoroacetylacetone, extracted into toluene and injected into the chromatograph using direct on-column injection. Under optimized instrumental conditions, better than picogram quantities of aluminum as the trifluoroacetylacetone complex may be detected. (Holoman-Battelle)
W74-01446

ATOMIC ABSORPTION METHOD FOR DETERMINING MICROMOLAR QUANTITIES OF ALIPHATIC SECONDARY AMINES,
Massachusetts Univ., Amherst. Dept. of Chemistry.
P. J. Oles, and S. Siggia.
Analytical Chemistry, Vol 45, No 12, p 2150-2151, October 1973. 2 tab, 7 ref.

Descriptors: Chemical analysis, *Pollutant identification, *Aqueous solutions, Methodology, Chemical reactions, Chemical precipitation, Nitrogen compounds, Organic compounds.
Identifiers: *Amines, *Atomic absorption spectrophotometry, *Organonitrogen compounds, *Aromatic amines, Dialkyldithiocarbamic acids, Detection limits, Chemical recovery, Diethylamine, N-methylaniline, N-Ethyl-n-butylamine, Nickel dialkyldithiocarbamate, Di-n-butylamine, Di-n-hexylamine, Di-n-octylamine, N-Butyl-n-dodecylamine, Di-n-dodecylamine, Dicyclohexylamine, Piperidine.

The formation of a Cu or Ni dialkyldithiocarbamate (Cu (DTC)2 or Ni (DTC)2) precipitate from the reaction between either metal and dialkyldithiocarbamic acids (DTCH) in aqueous solution serves as the basis for the qualitative identification of secondary amines. In this study the Ni (DTC)2 formed in the reaction is separated from the reaction medium by filtering and is digested in a mixture of 1:1 HNO3:HCl. The resultant solution is then analyzed for nickel content by means of conventional atomic absorption spectrophotometry. A single calibration curve is required and, in this work, nickel di-n-butyldithiocarbamate (Ni (n-But2DTC)2) was used to prepare all calibration curves. Nine secondary amines and one aromatic amine (N-methylaniline) were studied by this procedure. Xanthate formation occurred in the secondary amine samples containing alcohol, but there was no interference observed. If the filter containing the precipitate is treated with the acid mixture, high recoveries result. The practical detection limit for the method is approximately 0.30 micromole of secondary amine per ml of solution with a reaction time of 1.5-2 hr, a medium fritted glass funnel for filtration and a temperature of 20C. N-methylaniline failed to react quantitatively under a wide range of conditions. Various temperatures, amounts of reagents, and reaction times were studied with recoveries of 60 to 90 percent, and the reproducibility obtained under identical experimental conditions was only fair. (Holoman-Battelle)
W74-01492

ANALYTICAL METHODOLOGY FOR BIOACTIVE COMPOUNDS. PHOTOCHEMICALLY ASSISTED ANALYSIS OF CHLORINATED HYDROCARBON PESTICIDES IN THE PRESENCE OF POLYCHLORINATED BIPHENYLS,
Michigan State Univ., East Lansing. Pesticide Research Center.
R. A. Leavitt, G. C. C. Su, and M. J. Zabik.
Analytical Chemistry, Vol 45, No 12, p 2130-2131, October 1973. 2 fig, 1 tab, 12 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Polychlorinated biphenyls, Methodology, *Pollutant identification, Pesticide residues, Chemical analysis, *Gas chromatography, DDE, Dieldrin, DDT, Insecticides.
Identifiers: *Electron capture gas chromatography, Quantitative analysis, *Photodegradation, Isomers, Degradation products, Precision, Photolysis, Chemical interference, Accuracy, Detection limits, Aroclor 1254, Reproducibility, Photodecomposition, p p'-Dichlorobenzophenone, 2 2-bis- (p-Chlorophenyl)-1-chloroethylene, Gas liquid chromatography, 2-(p-Chlorophenyl)-2- (dichlorophenyl)-1-chloroethylene.

Three chlorinated pesticides, dieldrin, DDT, and DDE were chosen to test the applicability of removing PCB's and the chlorinated pesticides in the presence of each other. Under the gas-liquid chromatographic conditions used in the study, certain PCB peaks interfered with each pesticide peak. In addition, the GLC peaks for DDE and dieldrin had similar retention times. To determine the optimum period of irradiation at 280-320 nm (Irradiation at 253.7 nm was quite destructive to the pesticides and caused large trailing solvent peaks probably due to chlorination of the solvent.), two concentrations (1 and 10 ppm) of Aroclor 1254 were photolyzed and the total GLC peak area was measured as a function of time. In addition to the reduction in total PCB peak area, there was, a general shift to peaks of shorter retention times as the PCB's were stepwise photochemically degraded to the less chlorinated isomers. Under the photolytic conditions used, the chlorinated pesticides also underwent varying degrees of degradation. Use of photochemical degradation to remove PCB's from samples also containing chlorinated hydrocarbon pesticide residues can be a very effective method even when the PCB concentration is much larger than the individual pesticide concentrations. Total analysis time is less than one hour per sample with photolysis carried out over night. The lower limits of practical quantitation are equivalent to 0.5 ppm for PCB's and equivalent to 0.05 ppm for the individual chlorinated pesticides. Reproducibility tests showed this method to be very precise. (Holoman-Battelle)
W74-01493

DISTRIBUTION STUDIES OF RADIUM AND OTHER METALLIC ELEMENTS BETWEEN THENOYLTRIFLUOROACETONE IN METHYL ISOBUTYL KETONE AND AQUEOUS SOLUTIONS,
Oak Ridge Associated Universities, Inc., Tenn. Special Training Div.
W. M. Jackson, and G. I. Gleason.
Analytical Chemistry, Vol 45, No 12, p 2125-2129, October 1973. 7 tab, 7 ref.

Descriptors: *Aqueous solutions, Separation techniques, Heavy metals, Solvent extractions, *Alkaline earth metals, *Alkali metals, *Radioactivity techniques, Separation techniques, Tracers, Methodology, Radioisotopes, Iron, Molybdenum, Gold, Magnesium, Manganese, Cobalt, Nickel, Copper, Lead, Radium radiosiotopes, Hydrogen ion concentration, Zinc, Cadmium, Calcium, Strontium.
Identifiers: Distribution coefficients, *Thenoyltrifluoroacetone, *Ketones, *Radium, Rare earth elements, Organic solvents, Ra-224, Liquid scintillation, Atomic absorption spectrophotometry, Thorium, Praseodymium, Barium, Technetium, Tungsten, Indium, Yttrium, Lanthanum, Thallium, Co-60, Fe-59, Mn-54, Ni-63, Cu-64, As-76, Au-198, Mo-99, Pr-142, W-187, Pb-212, Th-228.

Using a standardized procedure previously reported, the distribution of radium and 13 other metallic elements were quantitatively compared, by distributing a radiotracter of the element of interest between an aqueous phase and an organic phase consisting of 0.1 M TTA in MIBK. From the ratio of activity in the organic phase to activity in the aqueous phase, distribution coefficients were calculated as a function of pH (Atomic absorption was used for measuring the concentration of magnesium). Using radium-224, the extraction of radium by TTA in MIBK was successfully demonstrated to occur under almost identical pH conditions as previously reported for barium. In addition, distribution coefficients for reversible extractions into the TTA-MIBK phase from the aqueous phase were measured for magnesium, manganese, cobalt, nickel, copper, praseodymium, lead, and thorium. When the log D values were plotted vs. pH for iron, molybdenum, technetium, tungsten, and gold, the normal S-shaped curves were not obtained. From the data, pH conditions can be selected to allow the separation of the daughter elements, radium and lead, from thorium, as well as for many other element pairs. (Holoman-Battelle)
W74-01494

GAS-SOLID CHROMATOGRAPHY ON MACRORETICULAR CATION EXCHANGE RESINS,
Seton Hall Univ., South Orange, N.J. Dept. of Chemistry.
R. F. Hirsch, H. C. Stober, M. Kowblansky, F. N. Hubner, and A. W. O'Connell.
Analytical Chemistry, Vol 45, No 12, p 2100-2105, October 1973. 2 fig, 7 tab, 22 ref.

Descriptors: *Cation exchange, *Pollutant identification, Alkali metals, Alkaline earth metals, Selectivity, Heavy metals, Separation techniques, Methodology, Organic compounds, Aromatic compounds, Cations, Hydrogen, Sodium, Potassium, Cesium, Magnesium, Calcium, Strontium, Zinc, Chromium.
Identifiers: *Macroreticular cation exchange resins, *Aromatic hydrocarbons, *Gas solid chromatography, *Aliphatic hydrocarbons, Olefins, Thermal stability, Retention time, n-Alkanes, Amberlyst A-15, Ion exchange resins, Lithium, Rubidium, Barium, Lanthanum, Pentane, Hexane, Heptane, Octane, Cyclohexene, Benzene, Cyclopentane, Cyclohexane, Cycloheptane, Cyclooctane, 2-Methylpentane, 2 2 4-Trimethylpentane, Methylcyclopentane, 1-Heptene, 1-Hexene, 1-Octene, 2 3-Dimethyl-2-butene, 3 3-Dimethyl-1-butene.

Several metal ion forms of the macroreticular cation exchanger Amberlyst 15 were prepared and tested for use as gas-solid chromatographic (GSC) packings for the separation of a wide variety of hydrocarbons including normal alkanes and aromatic hydrocarbons. A drop of the test compound was evaporated inside a stoppered flask to which a small amount of methane had been added. Samples were withdrawn and injected into the chromatograph with methane being used as a marker for the calculation of retention times. Macroreticular cation exchange resins were found to be adsorptive packings for gas-solid chromatography, and to show good selectivity among hydrocarbons. Short columns were satisfactory even at temperatures well above the boiling points of the compounds being separated. Retention indices correlated with the size and electronic structure of the resins cation. In the alkali metal and alkaline earth series, retention indices of aromatic compounds increase with cation size. The silver form of the resin retains aromatic and olefinic compounds strongly, and separates geometric isomers of the olefins. Data are also presented on the effect of specific surface area and sample size on retention, and on the thermal stability of the various resin forms. (Holoman-Battelle)
W74-01495

ION PAIR PARTITION CHROMATOGRAPHY OF ORGANIC AMMONIUM COMPOUNDS,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
S. Eksborg, and G. Schill.
Analytical Chemistry, Vol 45, No 12, p 2092-2100, October 1973. 8 fig, 7 tab, 28 ref.

Descriptors: *Separation techniques, *Pollutant identification, Methodology, Organic compounds, Ammonium compounds, Solvent extractions.
Identifiers: *Ion pair partition chromatography, *Quaternary alkylammonium ions, *Quantitative analysis, *Organoammonium compounds, Alkylammonium picrates, Extraction constants, Liquid liquid chromatography, Chemical recovery, Molar absorptivity, Chromatographic peaks, Chemical concentration, 2-Hydroxyethyltrimethylammonium picrate, Organic solvents, Tetrabutylammonium benzoate, Tetrabutylammonium salicylate, Tetrabutylammonium toluene-4-sulfonate, Tetrabutylammonium dipicrylamate, Tetrabutylammonium chloride.

Liquid-liquid chromatography systems based on ion pair partition have been studied with quaternary alkylammonium ions as samples, chloroform plus 1-pentanol (19 plus 1) as mobile phase and aqueous picrate solution as stationary phase on a cellulose support. The highest separating efficiency was obtained in 2.7 mm columns with stationary phase loadings of 25-38 percent of the support weight. Maximum separating speed was obtained at k prime equals 5 in the 2.7-mm column, where a mobile phase speed of 3 mm/sec gave H equals 0.5 mm. The influence of stagnant mobile phase was negligible. H was not affected by the amount of sample within the range 0.01 nmole-0.1 micromole in columns with a high counterion concentration. An increase of the sample volume to 500 microliters (V sub m equals 1.4 ml) decreased the number of theoretical plates by less than 20 percent. Leading of the chromatographic peaks appeared at low sample concentrations due to dissociation of the ion pair in the organic phase. It could be suppressed by a controlled bleeding of the counterion. Quantitative determinations based on the peak area and the molar absorptivity of the ion pair gave recoveries of 95 plus or minus 9 percent with 30-pmole samples. (Holoman-Battelle)
W74-01496

ROTAMETER.
For primary bibliographic entry see Field 07B.
W74-01500

THERMAL AND BASE-CATALYZED HYDROLYSIS PRODUCTS OF THE SYSTEMIC FUNGICIDE, BENOMYL,
California Univ., Davis. Dept. of Environmental Toxicology.
For primary bibliographic entry see Field 05B.
W74-01504

MICROBIAL CULTURE MEDIA PREPARATION,
Western Australian Inst. of Tech., Perth. Dept. of Medical Technology.
J. D. Neal.
Laboratory Practice, Vol 22, No 7, p 477-495, July 1973. 16 ref.

Descriptors: *Bacteria, Cultures.
Identifiers: *Culture media, *Sample preparation.

General guidelines are given based on experience in industrial, educational, and medical laboratories for preparing satisfactory culture media. The effects of storage of media; materials used in preparing media such as water, agar, gelatin, carbohydrates, peptones, meat extracts, blood, serum, plasma, and selective agents; control of pH; sterilization; and media testing on results are discussed. Possible areas of future development are considered. (Little-Battelle)
W74-01505

ION SELECTIVE SENSORS,
State Univ. of New York, Buffalo. Dept. of Chemistry.
G. A. Rechnitz.
Research/Development, Vol 24, No 8, p 18-20, August 1973. 4 fig, 2 tab, 6 ref.

Descriptors: Automation, Heavy metals, *Cadmium, *Lead, *Copper, Halides, Enzymes, Urine, *Electrodes.
Identifiers: *Ion selective electrodes, Miniaturaization, Membrane electrodes, Flow-through electrodes, Serum, Immobilized enzymes, *Silver.

Microsize ion-selective membrane electrodes have been developed which can be used to measure specific ions in human bodies by inserting them with hypodermic needles. Crystal membrane electrodes with tip diameters of 50 microns can detect Ag, Cd, Pb, Cu and halide ions in geological samples. Flow-through electrodes in 'lollipop' shape can detect anions and cations in solutions. These electrodes have proved useful in automated analysis systems where they have replaced optical components. The system operates at 20 to 70 samples per hour and is limited by mechanical components of the system. Future possibilities for ion electrodes are given. (Little-Battelle)
W74-01506

INFRARED STUDIES OF CHLORINATED DIBENZO-P-DIOXINS AND STRUCTURALLY RELATED COMPOUNDS,
Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics.
J-Y. T. Chen.
Journal of the Association of Official Analytical Chemists, Vol 56, No 4, p 962-975, July 1973. 24 fig, 7 tab, 20 ref.

Descriptors: *Pollutant identification, Pollutants, Organic compounds.
Identifiers: *Chlorinated hydrocarbons, *Infrared spectra, *Infrared spectophotometry, *Chlorodibenzo-p-dioxins, Chlorodibenzodioxins, Characterization, Dibenzo-p-dioxin, 1-Chlorodibenzo-p-dioxin, 2-Chlorodibenzo-p-dioxin, 1 6-Dichlorodibenzo-p-dioxin, 2 3-Dichlorodibenzo-p-dioxin, 2 7-Dichlorodibenzo-p-dioxin, 2 8-Dichlorodibenzo-p-dioxin, 1 2 4-Trichlorodibenzo-p-dioxin, 2 8-Dichlorodibenzo-p-dioxin, Octachlorodibenzofuran, 1 2 3 4-Tetrachlorodibenzo-p-dioxin, 1 3 6 8-Tetrachlorodibenzo-p-dioxin.

Reference infrared spectra of 24 chlorinated dibenzo-p-dioxins (DPD) and structurally related compounds are presented. These reference spectra are recorded using micro quantities of synthesized compounds in order to obtain spectra like those expected from chlorinated DPD residue isolates. The observed characteristic frequencies are tabulated in correlation tables. Their significance is interpreted in terms of the substituents and electronic effects. The positions of various absorption bands depend on the total number and positions of the chlorine substituents. The positions of the absorption bands indicate relative bond strengths. (Holoman-Battelle)
W74-01509

DOUBLE PULSE COULOSTATICS,
Northern Illinois Univ., DeKalb. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01511

GLASS-METAL COMPOSITE ELECTRODES,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01512

ION-ELECTRODE BASED AUTOMATIC GLUCOSE ANALYSIS SYSTEM,
State Univ. of New York, Buffalo. Dept. of Chemistry.
R. A. Llenado, and G. A. Rechnitz.
Analytical Chemistry, Vol 45, No 13, p 2165-2170, November 1973. 8 fig, 5 tab, 24 ref.

Descriptors: *Chemical analysis, *Aqueous solutions, *Automatic control, Laboratory equipment, Research equipment, Carbohydrates, Enzymes, Pollutant identification, Methodology, Proteins, Calibrations, Sampling, Rates, Temperature, *Electrodes.
Identifiers: Ion selective electrodes, Membrane electrodes, *Glucose, Biological samples, *Continuous flow system, Reproducibility, Precision, Enzymatic techniques, Serum, Iodide electrodes, Chemical interference.

An automated analysis system is described which utilizes a novel flow-through type ion-selective membrane electrode for the enzymatic determination of glucose. The system functions well in conjunction with aqueous, protein-loaded, and serum samples containing glucose in the physiological concentration range at sampling rates of up to 70 determinations per hour. The proposed methodology eleiminates the need for color development or dialysis steps and successfully overcomes protein interference at membrane electrodes via improved electrode design. (Holoman-Battelle)
W74-01513

ANALYTICAL APPLICATIONS OF PULSED VOLTAMMETRIC STRIPPING AT THIN FILM MERCURY ELECTRODES,
Colorado State Univ., Fort Collins. Dept. of Chemistry.
T. R. Copeland, J. H. Christie, R. A. Osteryoung, and R. K. Skogerboe.
Analytical Chemistry, Vol 45, No 13, p 2171-2174, November 1973. 4 fig, 3 tab, 17 ref.

Descriptors: *Analytical techniques, *Lead, *Cadmium, Pollutant identification, Reliability, Heavy metals, Chemical analysis, Methodology, Water analysis, Urine, Aqueous solutions, *Electrodes.
Identifiers: Thin film mercury electrodes, *Voltammetry (Differential pulse stripping), Sensitivity, Biological samples, Sample preparation, Ion selective electrodes, Natural waters, Blood, Plasma, Body fluids, Linear scan stripping voltammetry.

The use of differential pulse stripping analysis with thin film electrodes for the determination of lead and cadmium in a variety of samples is described. Instrumental and chemical parameters have been thoroughly investigated and optimized for the direct determination of these elements in natural waters, blood, blood plasma, urine. Sample solutions were deoxygenated with prepurified nitrogen while in position in the rotating electrode assembly. Water samples and HNO3 digests of blood were prepared for analysis by adding 2 ml of acetate buffer to 25 ml of sample. Urine and blood plasma samples were prepared as above or by diluting 2 ml of sample and of buffer to 25 ml with distilled, deionized water. The results indicate that reliable analyses are obtained on samples as small as a few microliters under conditions which are more sensitive than linear scan stripping techniques by factors ranging from 4 to 20 or more. (Holoman-Battelle)
W74-01514

SR-87/SR-86 RATIOS AND TOTAL STRONTIUM CONCENTRATIONS IN SURFACE WATERS OF THE SCIOTO RIVER DRAINAGE BASIN, OHIO,
Miami Univ., Oxford, Ohio. Dept. of Geology.
For primary bibliographic entry see Field 05B.
W74-01516

BENTHIC MACROINVERTEBRATES AS INDEXES OF WATER QUALITY IN WHETSTONE CREEK, MORROW COUNTY, OHIO (SCIOTO RIVER BASIN),
Akron Univ., Ohio.
For primary bibliographic entry see Field 05B.
W74-01517

NITROGEN/ARGON RATIOS BY DIFFERENCE THERMAL CONDUCTIVITY,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
J. D. Cline, and S. Ben-Yaakov.
Deep-Sea Research and Oceanographic Abstracts, Vol 20, No 8, p 763-768, August 1973. 3 fig, 1 tab, 12 ref.

Descriptors: *Water analysis, Separation techniques, Sea water, Calibrations, *Nitrogen, *Argon.
Identifiers: Dissolved nitrogen, Dissolved argon, *Difference thermal conductivity, Precision, Sample preparation, Accuracy.

A method has been developed for the precise determination of dissolved nitrogen/argon ratios in seawater for the purpose of evaluating small changes in the dissolved nitrogen content. Nitrogen and argon are extracted from seawater (in vacuo) and separated from water vapor, carbon dioxide and oxygen. The residual nitrogen-argon mixture is swept over a thermal conductivity detector with a carrier gas of the same composition, except for having a slightly different argon mole fraction. Calibration is carried out by equilibrating seawater at various temperatures with air. The technique has been used successfully in the analysis of N2/Ar ratios from the intermediate depths of the eastern tropical Pacific Ocean and the Cariaco Trench. Precision is estimated at plus or minus 0.2 percent at the 95 percent confidence level; the accuracy depends on the solubility tables used and the method of equilibration. (Little-Battelle)
W74-01522

CONCENTRATIONS OF SOME TRACE METALS IN PELAGIC ORGANISMS AND OF MERCURY IN NORTHEAST ATLANTIC OCEAN WATER,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W74-01523

ELEMENT CONSTITUTION OF SELECTED AQUATIC VASCULAR PLANTS FROM PENNSYLVANIA: SUBMERSED AND FLOATING LEAVED SPECIES AND ROOTED EMERGENT SPECIES,
Pennsylvania State Univ., University Park. Dept. of Biology.
F. S. Adams, H. Cole, Jr., and L. B. Massie.
Environmental Pollution, Vol 5, No 2, p 117-147, September 1973. 17 fig, 6 tab, 15 ref.

Descriptors: *Bioindicators, *Nutrients, Water pollution effects, *Floating plants, *Rooted equatic plants, *Submerged plants, *Metals, Phosphorus, Potassium, Calcium, Manganese, Magnesium, Iron, Copper, Zinc, Sodium, Aluminum, Boron, Aquatic plants, Pondweeds, Statistical methods, *Pennsylvania.
Identifiers: Sample preparation, Emission spectroscopy.

Thirty species of submersed and floating leaved Aquatic Vascular Plants (AVPs) and fifteen species of rooted emergent AVPs were collected from fourty-four and forty-two locations, respectively, in the Delaware, Susquehanna and Allegheny river watersheds in Pennsylvania and analysed by emission spectrometry for element constitution of eleven potentially-polluting ions including: P, K, Ca, Mg, Mn, Fe, Cu, B, Al, Zn, and Na. The purpose was to attempt to identify plants which might serve as bioindicators of water pollution. The areas sampled are widely diverse with respect to geological, geographical, and cultural conditions. Entire plants were collected from strategic locations, washed, blotted dry, wrapped in Kraft-paper towelling and placed in numbered Kraft bags for oven drying. Additional plants were placed in polyethylene bags for identification. Results of elemental analysis were subjected to analysis of variance. Because of their wide occurrence and response to potentially polluting ions, Elodea canadensis, Potamogeton crispus, Myriophyllum exalbescens, Justicia americana and the Sparganiums were selected for additional studies designed to investigate pathways of nutrient assimilation and the effect of nutrient pollution upon productivity, morphology and reproduction. (Little-Battelle)
W74-01526

GROWTH RATES OF SEDIMENT-LIVING MARINE PROTOZOAN AS A TOXICITY INDICATOR FOR HEAVY METALS,
Leeds Univ. (England). Wellcome Marine Lab.
J. S. Gray, and R. J. Ventilla.
AMBIO, Vol 11, No 4, p 118-121, 1973. 3 fig, 2 tab, 15 ref.

Descriptors: *Growth rates, *Protozoa, *Toxicity, Water quality, *Heavy metals, *Bioindicators, *Bioassay, Animal growth, Water pollution effects, Mortality, Water pollution, Lethal limit, Invertebrates, Mercury, Zinc, Lead, Salinity, Water temperature, Environmental effects, Laboratory tests.
Identifiers: *Cristigera spp, Median tolerance limit, Data interpretation, Factorial analysis, Culture media.

The classical method for measuring the toxicity of a chemical to a marine organism is by the LC50 test. Considerations should be given to the criticisms directed toward the test: (1) duration of the test, (2) survival and subsequent behavior of test organisms, (3) selection of temperature, (4) trophic level of the test organisms, and (5) use of single chemicals as opposed to mixtures as present in nature. In an attempt to allay such criticisms an organism of low trophic level, a bacterivorous ciliate was used and changes in growth rate rather than mortality were measured as criteria of pollution. It was also deemed necessary to investigate responses of test organisms to interacting environmental variables prior to testing chemical toxicity. Using factorial designs and response surface analysis, experimental conditions were optimized with respect to salinity-temperature combinations. With near optimum conditions the effects of mercuric ions (HgC12), lead ions (Pb (NO3)2) and zinc ions (ZnSO4) were tested each at three concentrations in a 3 to the 3rd power factorial design. HgC12 at an added concentration of 0.0025 ppm reduced growth rate by 9.7 percent, Pb (NO3) at 0.15 ppm by 8.5 percent and ZnSO4 at 0.125 ppm by 8.3 percent. On mixing the chemicals, significant supplemental synergistic effects were found at all two factor and three factor combinations. Models of the effects and graphical response surface contours are given. Since many chemicals are likely to interact (supplementally or antagonistically), the method used seems of widespread relevance to toxicity testing. (Holoman-Battelle)
W74-01529

BOTTOM FAUNA AS AN INDICATOR OF WATER QUALITY IN SWEDEN'S LARGE LAKES (LAKES MALAREN, VATTERN AND VANERN),
Uppsala Univ. (Sweden). Inst. of Zoology.
For primary bibliographic entry see Field 05B.
W74-01531

SILICA GEL MEDIUM FOR ENUMERATION OF PETROLEUMLYTIC MICROORGANISMS IN THE MARINE ENVIRONMENT,
Tokyo Univ. (Japan). Ocean Research Inst.
H. Seki.
Applied Microbiology, Vol 26, No 3, p 318-320, September 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Sea water, Microbial degradation, Marine microorganisms, Oil, Marine bacteria, Water sampling, Cultures, Pacific Ocean, Ecological distribution.
Identifiers: *Enumeration, *Culture media, *Silica gel medium, *Petroleumlytic microorganisms, *Heterotrophic bacteria, Vertical distribution, Marine environment, *Japan (Tokyo Bay).

A silica gel medium was developed for the enumeration of petroleumlytic microorganisms and used aboard the research vessel Hakuho-maru of the University of Tokyo during the Leg KH-73-1 expedition in 1973. Seawater samples were collected with sterilized J-Z type bacteriological samplers (ORIT samplers). Enumerations were carried using a direct microscope count method and a plate count method. Autoclaved Gelman glass fiber filters type A were used to collect microorganisms from 100-ml samples and the inoculated filters were placed on the silica gel media and incubated at 20 C for 30 days before counting colonies. Petroleumlytic bacteria were enumerated by the method employed here in the pelagic region of the Pacific Ocean, as well as in the coastel region of Japan. Petroleumlytic bacteria formed colonies from only 44 samples among the 104 samples from the pelagic region, and usually less than 10 colonies of petroleumlytic bacteria were enumerated for each 100-ml seawater sample from the surface to 1,000 m depth at stations in the western north Pacific central water, whereas more than 10 colonies of the bacteria were enumerated for each 100-ml seawater sample in Tokyo Bay. This means that less than 0.001 percent of the total bacteria or less than 0.1 percent of the heterotrophic bacteria are petroleumlytic at the pelagic region. (Holoman-Battelle)
W74-01532

VIRUS CONCENTRATION FROM SEWAGE,
Baylor Coll. of Medicine, Houston, Tex. Dept. of Virology and Epidemiology.
For primary bibliographic entry see Field 05D.
W74-01533

ACRIDINE ORANGE-EPIFLUORESCENCE TECHNIQUE FOR COUNTING BACTERIA IN NATURAL WATERS,
North Carolina Univ., Chapel Hill. School of Public Health.
D. E. Francisco, R. A. Mah, and A. C. Rabin.
Transactions of the American Microscopical Society, Vol 92, No 3, p 416-421, July 1973. 6 fig, 2 tab, 12 ref.

Descriptors: *Aquatic bacteria, *Pollutant identification, *Viability, *Ecological distribution, Methodology, Filtration, Fluorescence, E. coli.
Identifiers: Acridine orange-epifluorescence technique, *Bacteria counting, Viable count, Membrane filters, Epifluorescence microscopy, Counting chambers, Pure cultures, Acridine orange, Staining, Fluorescence microscopy, Selenastrum capricornutum, Desmids, Bacillus megaterium, Staphylococcus aureus, Azotobacter vinelandii, Klebsiella, Bacillus subtilis, Coulter counter, Petroff-Hauser counter.

The utility of acridine orange staining and epifluorescence microscopy (AO-E) as a method for estimating bacterial numbers in natural waters has been examined. Total direct counts of aquatic bacteria from natural samples were estimated by epifluorescence microscopy after acridine orange staining. Cells were concentrated by membrane filtration on black membrane filters and counted directly. Using this method, bacterial counts of pure cultures corresponded to those obtained by the Petroff-Hauser and Coulter counter methods. Epifluorescence counting is the method of choice for ecological studies of the natural distribution of bacteria in aquatic environments since it permits ready discrimination of bacteria from detritus and does not rely on the adequacy of culture methods to elicit growth of all viable organisms. Total counts obtained in this way were related to glucose and acetate uptake by resident microbial populations of lake water sample. Viable counts of the same samples were not related. (Holoman-Battelle)
W74-01534

STUDIES ON METHANOL-OXIDIZING BACTERIA. I. ISOLATION AND GROWTH STUDIES,
Texas Univ., Austin. Dept. of Microbiology.
For primary bibliographic entry see Field 05C.
W74-01535

INVESTIGATIONS ON THE SHEATHED BACTERIUM HALISCOMENOBACTER HYDROSSIS GEN.N., SP.N., ISOLATED FROM ACTIVATED SLUDGE,
Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01539

ISOTOPE FRACTIONATION OF N-15 AND N-14 IN MICROBIOLOGICAL NITROGEN TRANSFORMATIONS: A THEORETICAL MODEL,
California Univ., Riverside.
For primary bibliographic entry see Field 05B.
W74-01541

THE CHEMICAL OXYGEN DEMAND OF WATERS AND BIOLOGICAL MATERIALS FROM PONDS,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
For primary bibliographic entry see Field 05C.
W74-01543

RHODOPSEUDOMONAS SULFIDOPHILA, NOV. SPEC., A NEW SPECIES OF THE PURPLE NONSULFUR BACTERIA,
Groningen Rijksuniversiteit (Netherlands). Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01544

PANKHURST TUBES MODIFIED TO INDICATE ANAEROBIOSIS,
Nairobi Univ. (Kenya).
D. D. Mara.
Laboratory Practice, Vol 22, No 9, p 583, September 1973. 1 fig, 2 ref.

Descriptors: *Anaerobic bacteria, *Anaerobic conditions, Cultures, Laboratory equipment, Indicators.
Identifiers: *Culturing vessels, *Pankhurst tubes.

A second sidearm has been added to the original Pankhurst tube in order to indicate anaerobiosis. This second sidearm would be used for the anaerobic indicator solution when stock cultures of anaerobes are maintained. (Holoman-Battelle)
W74-01545

EMISSION SPECTROMETRIC DETERMINATION OF TRACE METALS IN BIOLOGICAL TISSUES,
Alabama Univ., Birmingham. School of Medicine.
J. Webb, W. Niedermeier, and J. H. Griggs.
Applied Spectroscopy, Vol 27, No 5, p 342-347, September/October 1973. 3 fig, 5 tab, 24 ref.

Descriptors: *Trace elements, *Pollutant identification, *Chemical analysis, Hogs, Heavy metals, Alkali metals, Alkaline earth metals, Copper, Aluminum, Manganese, Nickel, Cesium, Strontium, Chromium, Zinc, Lead, Molybdenum, Cadmium, Phosphorus.
Identifiers: *Animal tissues, *Emission spectoscopy, Sample preparation, *Matrix effects, Biological samples, Precision, Heart, Biological materials, Barium, Tin, Wet digestion.

An emission spectometric method of analysis is described which permits duplicate analyses to be performed on 1-g specimens of tissue for 13 elements in the microgram percent range. Pig hearts were dissected into 17 separate pieces representing discrete anatomic sites. Samples were prepared for analysis by low temperature wet digestion. On the basis of their composition of the macro elements sodium, potassium, and phosphorus, these tissues could be divided into two groups: one including blood vessels and heart valves, and the other including ordinary and specialized myocardium. A method is described for adjuting the macro element composition of these tissues to that of a common matrix, thus allowing trace metal analysis of both groups of tissues to be performed using only a single set of standards. A solution of the ash was placed in hollow cup graphite electrodes with center posts, evaporated to dryness, and analyzed in the dc arc with a Jarrell-Ash model 66,000 direct reading emission spectrometer. At concentrations above 10 microgram percent the coefficient of variation was about 10 percent for most of the trace metals studied. (Holoman-Battelle)
W74-01546

MICROBIAL FLORA AND LEVEL OF VIBRIO PARAHAEMOLYTICUS OF OYSTERS (CRASSOSTREA VIRGINICA), WATER AND SEDIMENT FROM GALVESTON BAY,
Texas A and M Univ., College Station. Dept. of Animal Science.
For primary bibliographic entry see Field 05C.
W74-01548

LITMUS MILK REACTION AS A DISTINGUISHING FEATURE BETWEEN STREPTOCOCCUS FAECALIS OF HUMAN AND NON-HUMAN ORIGINS,
Tennessee Univ., Knoxville. Dept. of Microbiology.
J. O. Mundt.
Journal of Milk and Food Technology, Vol 36, No 7, p 364-367, July 1973. 4 tab, 38 ref.

Descriptors: *Pollutant identification, *Separation techniques, Chemical reactions, Enteric bacteria, Wildlife, Insects, Public health, Streptococcus, Aerobic bacteria, Methodology, Fermentation.
Identifiers: *Streptococcus faecalis, *Enterococci, *Litmus milk reaction, Pollutant sources, Biochemical tests, Heterotrophic bacteria, Biochemical characteristics, Fecal bacteria, Characterization.

More than 90 percent of 1618 cultures of Streptococcus faecalis obtained from plants, wild animals, and insects produced a soft, reduced, rennet-like curd which underwent stratiform digestion in litmus milk, or else produced no reaction. Cultures of human origin produced a reduced, hard, acidic curd which sometimes was followed by acid-proteolytic digestion. Ten percent of the cultures commensal in nature fermented lactose in litmus milk to produce the hard, acidic curd which sometimes underwent acid-proteolytic digestion. One-third of this group of organisms failed to follow the typical pattern of fermentation by S. faecalis of human origin, that is fermentation of melezitose but not of melibiose. It is suggested that for cultures obtained during analytical procedures the reaction in litmus milk and the fermentation of melezitose and melibiose may be employed to distinguish between contamination representing recent pollution of human origin and the presence of S. faecalis as a member of the microflora of plants with no sanitary significance. (Holoman-Battelle)
W74-01549

2,4-DICHLOROPHENOXYACETATE METABOLISM BY ARTHROBACTER SP.: ACCUMULATION OF A CHLOROBUTENOLIDE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 05B.
W74-01550

SHIGELLA SONNEI ISOLATED FROM WELL WATER,
Iowa Univ., Iowa City. State Hygienic Lab.
S. S. Lindell, and P. Quinn.
Applied Microbiology, Vol 26, No 3, p 424-425, September 1973. 5 ref.

Descriptors: *Potable water, *Water wells, *Isolation, *Pollutant identification, *Pathogenic bacteria, Methodology, Cultures, Aerobic bacteria, Epidemics, Public health, Human diseases.
Identifiers: *Shigella sonnei, Selective media, Culture media, Membrane filters, Xylose-sysine-deoxcholate agar, Triple sugar-iron agar, Lysine-iron agar, Biochemical tests, Eosin methylene blue agar, MacConkey agar, Gram-negative broth, Differential media.

A method is described which led to the isolation of Shigella sonnei from well water suspected of being the primary foci in a school-associated shigellosis outbreak. Tap water samples were filtered by suction through a membrane filter. After filtration the membranes were placed on xylose-lysine-deoxycholate agar plates and incubated at 37C for 18 h. Suspicious colonies were further cultured on triple sugar-iron agar and lysine-iron agar for primary differentiation; only one colony was confirmed biochemically and serologically as Shigella sonnei. Results show that other media are necessary for a more comprehensive isolation of the organism. Further plans for such a study involve filtering smaller samples of the water and hence more membrane filters for inoculation of prescribed media. The membranes will be placed on both selective and differential media such as eosin methylene blue, MacConkey agar, and XLD. Membranes exhibiting growth will then be placed in gram-negative broth followed by plating on the above-mentioned media, thus enhancing the

chances for isolation of suspected pathogens. (Holoman-Battelle)
W74-01551

COMPARISON OF GELMAN AND MILLIPORE MEMBRANE FILTERS FOR ENUMERATING FECAL COLIFORM BACTERIA,
Tennessee Valley Authority, Chattanooga. Div. of Environmental Planning.
W. G. Presswood, and L. R. Brown.
Applied Microbiology, Vol 26, No 3, p 332-336, September 1973. 4 fig, 2 tab, 4 ref.

Descriptors: *Methodology, *E. coli, *Enteric bacteria, Temperature, Water analysis, Isolation, Cultures, Regression analysis, Statistical methods.
Identifiers: *Enumeration, *Fecal coliforms, *Membrane filters, Culture media, Data interpretation, Precision, Recovery, Biochemical tests, Gelman membrane filters, Millipore membrane filters, Culturing techniques, Species density, Pure cultures.

Tests of two leading brands of membrane filters used for enumerating fecal coliform bacteria showed that Gelman GN-6 filters recovered statistically more colonies of bacteria than did Millipore HAWG 047SO filters from pure cultures incubated at either 35C (the optimal growth temperature) or 44.5C (the standard temperature for the fecal coliform test). Standard membrane filter procedures with M-FC broth base were used to enumerate the organisms. Densities of colonies incubated on Gelman filters at 44.5C averaged 2.3 times greater than those on Millipore filters. Plate counts of the bacteria at both temperatures indicated that incumbation at 44.5C did not inhibit propagation of fecal coliform bacteria. For the pour plates, M-FC broth base plus 1.5 percent agar was used. This modified medium compared favorably to plate count agar for enumerating Escherichia coli. At 35 and 44.5C, colony counts on Gelman filters agreed closely with plate counts prepared concurrently, but Millipore counts were consistently lower than plate counts, especially at 44.5C. Comparative analyses of river water for fecal coliform bacteria by the membrane filter technique gave results comparable to those for the pure cultures. (Holoman-Battelle)
W74-01554

A FIRST RECORD OF RED-WATER PHENOMENON IN KASHMIR, INDIA,
Kashmir Univ., Srinagar (India). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-01564

SEPARATION AND IDENTIFICATION OF CARBOFURAN, ITS METABOLITES, AND CONJUGATES FOUND IN FISH EXPOSED TO RING C--14-LABELED CARBOFURAN USING ITLC SILICA GEL STRIPS,
Illinois Univ., Urbana. Agricultural Experiment Station.
W. N. Bruce.
J Econ Entomol, Vol 65, No 6, p 1738-1740, 1972, Illus.
Identifiers: *Carbofuran, Carbon-14, Conjugates, Counters, *Fish, Gels, Identification, Insecticide, *Metabolites, Scintillation, Separation, Silica, Spray, Thin layer chromatography.

A single unique technique was developed which effects cleanup, isolation of conjugates, and separation of metabolites found in fish. Using an internal standard technique, carbofuran and its metabolites were visualized as distinct, well-resolved bands by spraying the chromatogram with methanolic KOH and p-nitrobenzenediazonium fluoborate. The reddish-purple bands were cut into small pieces and dropped into scintillation vials for counting.--Copyright 1973, Biological Abstracts, Inc.
W74-01577

RELATIONSHIPS OF INDICATOR AND PATHOGENIC BACTERIA IN STREAM WATERS,
Detroit Univ., Mich.
For primary bibliographic entry see Field 05B.
W74-01645

COMPUTER IDENTIFICATION OF YEASTS OF THE GENUS SACCHAROMYCES,
Heroit-Watt Univ., (Soctland). Dept. of Brewing and Biological Sciences.
I. Campbell.
Journal of General Microbiology, Vol 77, No 1, p 127-135, July 1973. 2 fig, 1 tab, 26 ref.

Descriptors: *Yeasts, *Pollutant identification, *Speciation, *Computers, *Numerical analysis, Fungi, Systematics, Automatic control, Cultures, Biological properties, Computer programs.
Identifiers: *Saccharomyces spp, *Numerical taxonomy, Ascomycetes, Biochemical characteristics, Cell morphology,.

A punched-card system of identification by computer is described, whereby matching at over 85 percent with the description of a recognized Saccharomyces species constitutes identification. The system is based on a set of 39 invariable descriptions of species, so defined that no species is related at higher than 85 percent matching coefficient to any other species. (Holoman-Battelle)
W74-01646

5B. Sources of Pollution

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA TEXTILE INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 05G.
W74-01101

TRANSIENT MOVEMENT OF WATER AND SOLUTES IN UNSATURATED SOIL SYSTEMS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 02G.
W74-01104

WATER QUALITY EVALUATION OF REGIONALIZED WASTEWATER SYSTEMS,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-01107

BIOCHEMISTRY OF ESTUARINE ECOSYSTEM WITH EMPHASIS ON HEAVY METALS AND SHELLFISH,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 05C.
W74-01108

HYDROLOGIC NUTRIENT CYCLE INTERACTIONS IN UNDISTURBED AND MANIPULATED ECOSYSTEMS (WATERSHEDS),
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 04C.
W74-01110

NUTRIENT SOURCES AND TRANSPORT IN THE UPPER AND CENTRAL REGIONS OF THE BIG SIOUX RIVER,
South Dakota Cooperative Fishery Unit, Brookings.
D. C. Hales, and R. L. Applegate.
Available from the National Technical Information Service as PB-225 140/3, $3.75 in paper copy, $1.45 in microfiche. South Dakota State University, Brookings, Water Resources Institute Completion Report, June 1973. 88 p, 31 fig, 11 tab, 37 ref. OWRR A-029-SDAK (1). 14-01-0001-3842.

Descriptors: *Nutrients, Water quality, *Path of pollutants, Surface waters, *South Dakota, Nitrogen, Phosphates, Water pollution sources.
Identifiers: *Big Sioux River (SDak).

The upper Big Sioux River Basin, in northeastern South Dakota, was studied to determine the origin and transport of nutrients in the Big Sioux River. The area was divided into three segments. Two of the segments, the Big Sioux River and Willow Creek Basins, were primarily agricultural drainage areas, and one segment was the city of Watertown. Sampling stations were selected to facilitate the determination of nutrient inputs to the river from each of these segments and to determine the nutrient load in the river leaving the study area. Nutrients studied included total orthophosphate and the particulate and dissolved fractions of organic carbon, organic nitrogen, and total phosphate. The annual load leaving the study area amounted to 1,507,820 kg, 127,320 kg, and 140,310 kg of TOC, TON, and TP, respectively. Approximately 90 percent of the TOC, 87 percent of the TON, and 67 percent of the TP was attributed to the agricultural drainage areas. Eleven percent of the TOC, 27 percent of the TON, and 41 percent of the TP was attributed to the city of Watertown. (Wiersma-South Dakota)
W74-01115

EFFECTS OF PROTOZOA ON THE FATE OF PARTICULATE CARBON,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05C.
W74-01117

MATHEMATICAL MODELING OF NUTRIENT - TRANSPORT,
Massachusetts Univ., Amherst. Water Resources Research Center.
F. A. Di Giano.
Available from the National Technical Information Service as PB-225 127/0, $3.00 in paper copy, $1.45 in microfiche. Publication No 17, 1971. 37 p, 12 fig, 6 ref. OWRR B-005-MASS (3).

Descriptors: *Nutrients, Movement, Surface waters, *Bottom sediments, *Model studies, Analytical techniques, Chemical reactions, Diffusion, Adsorption, Porosity, *Path of pollutants, *Mathematical models, Equations, Water chemistry, Biochemistry, Inorganic compounds.
Identifiers: *Nutrient transport.

The derivation of the mathematical models for nutrient transport in deposit-water systems is based upon the mode of physical mass transfer via diffusion and adsorption. The influence of biological and chemical interactions on the transfer are not directly involved. Both porosity and tortuosity of the deposit are physical properties of import. Porosity controls the total flux of nutrients per unit area of deposit. Tortuosity which is a measure of the 'effective' diffusional path, determines the depth of nutrient penetration. Both of these properties may be altered by chemical changes within the bottom deposit. The two primary objectives in seeking a simple but valid model of the system are: (1) to obtain a physical system constant, i.e. and 'effective' diffusion coefficient which can be used to estimate the flux of nutrients through the deposit and the depth of penetration; and (2) to examine the rate-limiting step (steps) of nutrient transport by modeling the interplay of 'interfacial resistance' and pore diffusion and adsorption. The four models described are (1) pore diffusion through interstitial water of deposit, (2) interfacial

mass transport, (3) diffusion with simultaneous adsorption, and (4) release of nutrients via diffusion. This last model of simultaneous adsorption and diffusion may be most useful in gaining an understanding of nutrient interchange. (Woodard-USGS)
W74-01121

HOLBROOK COVE SURVEY--A 1972 STUDENT SUMMER OCEAN ENGINEERING LABORATORY RESEARCH PROJECT.
Massachusetts Inst. of Tech., Cambridge.

Available from NTIS, Springfield, Va., 22151 as COM-73-10621 Price $3.00 printed copy; $1.45 microfiche. Massachusetts Institute of Technology Sea Grant Project Office Report No MITSG 72-19, December 31, 1972. 162 p, 29 fig, 11 tab.

Descriptors: *Water pollution sources, *Heavy metals, *Mine wastes, *Maine, Data collections, Oceanography, Coasts, Geomorphology, Ocean currents, Tidal effects, Bottom sediments, Computer programs, Path of pollutants, Ecology.
Identifiers: *Holbrook Cove (Me).

This report is the first of two volumes concerning the accomplishments of the 1972 M.I.T./Maine Maritime Academy Sea Grant Summer Ocean Engineering Laboratory. It describes the investigations students conducted in an oceanographic and biological survey of Holbrook Cove, Maine, in July 1972. The objective of the survey was to gain an understanding of the hydraulics and ecology of the coves in order to ascertain the effect of heavy metal pollution from the Callahan mine outfall. Holbrook Cove is located approximately one-half mile southwest of Castine, Maine. Data for study projects include: tidal current streamlines and velocity; temperature and salinity; chlorophyll 'A' content; benthic infauna distribution; tidal height fluctuations; detailed bottom topography; bottom soil structure; and water oxygen content. Computer programs are presented in the appendix. (Woodard-USGS)
W74-01131

URBANIZATION AND ITS EFFECTS ON REGIMEN AND QUALITY OF SURFACE WATERS (URBANIZATSIYA I YEYE VLIYANIYE NA REZHIM I KACHESTVO POVERKHNOSTNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 04C.
W74-01139

INVESTIGATIONS ON THE INFLUENCE OF TIDES ON SALINITY, CONTENT OF SUSPENDED MATTER, SEDIMENTATION AND BACTERIA COUNTS IN THE ELBE ESTUARY, (UNTERSUCHUNGEN UBER DIE EINWIRKUNG DER TIDE AUF SALZGEHALT, SCHWEBSTOFFGEHALT, SEDIMENTATION UND BAKTERIENGEHALT IN DER UNTERELBE),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 02L.
W74-01175

ON THE SMALL-SCALE HORIZONTAL DIFFUSION NEAR THE COAST,
Japan Atomic Energy Research Inst., Tokyo.
N. Ito.
Journal of the Oceanographical Society of Japan, Vol 19, No 4, p 182-186, January 1964. 3 fig, 1 tab, 4 ref.

Descriptors: Dye releases, *Coasts, *Diffusion, Radioactive wastes, Pollutant identification, Dilution, *Path of pollutants.
Identifiers: Japan (Tokaimura).

Several small-scale dye-release experiments, which were carried out off Tokaimura by Japan Atomic Energy Research Institute and other research institutes, are described. The results showed that the diffusion constant defined in this paper was approximately fitted in all the experiments performed and the horizontal concentration distribution of released material could be estimated, using the constant. These may be applicable in the problem of environmental safety around atomic establishments to estimate the dilution of radioactive effluent diffusing into sea water. (Sinha-OEIS)
W74-01186

A STUDY OF TIDAL DISPERSION IN THE POTOMAC RIVER,
Federal Water Pollution Control Administration, Annapolis, Md. Chesapeake Bay-Susquehanna River Basin Project.
L. J. Hetling, and R. L. O'Connell.
Water Resources Research, Vol 2, No 4, p 825-841, 1966. 12 fig, 3 tab, 7 ref.

Descriptors: *Potomac River, *Estuaries, *Dispersion, Water pollution sources, Density currents, *Tidal effects, Dye dispersion, Tracers, *Outfall sewers, *Path of pollutants.

A dye tracer experiment was performed to determine the dispersive properties of the Potomac estuary. A fluorescent dye, Rhodamine WT, released continuously for 13 days through a submerged outfall sewer, was traced effectively over the upper 25 miles of the estuary for 34 days. Observed dye distributions were analyzed using a classical 1-dimensional advection-diffusion model applied to each of 16 discrete volume segments. Repetitive analog computer solution of the resulting set of 16 linear differential equations showed that dispersion coefficients increasing from 0.2 to 0.6 sq mi/day in a downstream direction gave a satisfactory temporal and spatial description of the observed dye distribution. The dye loss in the estuary was found to be described by a first-order reaction rate constant that had an upper limit of 0.034 day-1. The effect of river inflow on the distribution of a nonconservative pollutant from a point source discharge was calculated using the model. (Sinha-OEIS)
W74-01196

COMPUTER SIMULATION OF ESTUARIAL NETWORKS,
California Univ., Berkeley. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W74-01197

EXPERIMENTS AND HYDROGRAPHIC SURVEYS OFF SANDY HOOK, NEW JERSEY (1963),
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 02L.
W74-01199

INVESTIGATIONS ON THE CHANGES IN THE CONTENT OF HEAVY METALS IN LAKE WATERS OF THE MASURIAN LAKE DISTRICT,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowa (Poland). Instytut Hydrobiologii Ochrany Wodnego.
F. Wieclawski.
Acta Hydrobiol. Vol 14, No 2, p 149-163, 1972. Illus.
Identifiers: *Heavy metals, *Zinc, Lakes, *Poland (Masurian Lake Dist.), Water pollution sources.

Waters from 2 levels of lakes of the Masurian Lake District (Poland) were investigated from 13th Nov. 1967 to 13th May 1968 for the content of traces of heavy metals in ionic form. The chosen lakes (Trzcinno, Kortowskie, Mutek, Starodworskie and Dlugie) represent types from Beta-mesotrophy to advanced eutrophy remaining under the influence of pollution. The range of variations in the content of traces of ions of heavy metals in microgram/1 determined according to the polarographic method after their preliminary concentration on a dithizone column is the following: Pb 0.2-2.2, Cd 0.0-0.3, Zn 0.2-9.7, Mn 0.0-9.8, Cu 0.1-4.5, Co<0.1. These microelements, ordered in a sequence of decreasing concentrations, form the following series: Mn, Zn, Cu, Pb, Cd, and Co. Mn and Zn showed the greatest seasonal variability and Pb the least. The occurrence of a larger amount of microcomponents of waters, particularly distinct for Zn, was observed 3 times in the course of these investigations, namely during the period of culminant inflows of waters from the catchment basins to the lakes, and in the early season of spring 'blooms' of lake waters. No passing of ions of heavy metals from sediments to water was observed.--Copyright 1973, Biological Abstracts, Inc.
W74-01221

THE EFFECT OF MICROBIAL ACTIVITY UPON THE SEDIMENTARY SULPHUR CYCLE,
University of the South Pacific, Suva (Fiji).
D. B. Nedwell, and G. D. Floodgate.
Mar Biol (Berl). Vol 16, No 3, p 192-200. 1972. Illus.
Identifiers: *Microbial activity, *Sulfur cycle, Sulfates, *Intertidal sediments.

The sulfate content of an intertidal sediment at Anglesey (UK) varied during the year, the sulfate-reducing activity of the microbial population being limited by low temperature during winter, and by the low numbers of sulfate-reducing bacteria during May, 1969. A corresponding annual variation of the sedimentary sulfide could not be demonstrated, and the sulfide which was formed biologically during the course of the year was almost entirely lost from the sediment. This loss of sulfide was probably due to subsurface oxidation; and flushing, by water entering at the base of the sediment. It is suggested that sulfide was only precipitated within the sediment during summer when sulfate reduction was active.--Copyright 1973, Biological Abstracts, Inc.
W74-01239

SOME OBSERVATIONS ON BACTERIAL POPULATIONS IN WILGREEN LAKE, MADISON, KY.,
Eastern Kentucky Univ., Richmond. Dept. of Biological Sciences.
R. B. Otero, and S. Leung.
Trans Ky Acad Sci. Vol 33, No 1/2, p 16-26, 1972, Illus.
Identifiers: *Bacterial populations, Cattle, *Fecal coliforms, *Kentucky (Wilgreen Lake), Lakes, *Water quality standards.

Wilgreen Lake is being polluted by several important sources: Old Town Branch which flows into Wilgreen Lake from the southern end, Taylor Fork Creek which enters Wilgreen Lake from the eastern end, septic tank leakage from housing development on the eastern tip of the lake, cattle which graze along the shorelines of the lake and tributaries, the creek along Route 52 coming from the University Shopping Center-Lancaster Woods Estate which eventually empties into Taylor Fork Creek, an aeroflow disposal plant on the northeastern tip of Wilgreen Lake and Caleast tributary which flows into the lake from the western end. Fecal coliforms ranged from a low of 100/100 ml at many stations to a high of 100,00/100 ml at Station 43 in Oct. Total coliforms ranged from about 100/100 ml at several stations to 1.3 x 107/100 ml at Station 43 in Oct. Of the 192 samples tested for total coliform, all but 24 (87%) were higher than the 1000 organisms/100 ml allowed by the Proposed Standards for Water Quality of the Kentucky Water Pollution Control Commission, 1971.--Copyright 1973, Biological Abstracts, Inc.

W74-01242

SURVIVAL OF COLIFORM BACTERIA IN NATURAL WATERS: FIELD AND LABORATORY STUDIES WITH MEMBRANE-FILTER CHAMBERS,
Montana State Univ., Bozeman. Dept. of Botany and Microbiology.
G. A. McFeters, and D. G. Stuart.
Appl Microbiol. Vol 24, No 5, p 805-811. 1972, Illus.
Identifiers: *Bacteria, *Coliform, Field studies, Laboratory studies, *Montana (Middle Creek), Natural water, Survival, *Membrane filter chambers.

Chambers with membrane-filter side walls were designed for studies of the survival of coliform bacteria in natural and artificial waters. Experiments were carried out in the field and in the laboratory. The initial uptake rate of inorganic ions, total carbon and glucose into the chamber was greater than twice as fast as the accumulation of each into dialysis tubing. When the survival of a water-isolated fecal coliform bacterium was examined in 2 adjacent mountain streams, the organism persisted longer in Bozeman Creek than in Middle Creek, Montana. These data may be a reflection of the water chemistry because the concentration of inorganic constituents of the former was greater. Laboratory studies of the survival of a fecal coliform bacterium in artificial and natural water with continuous flow were used to determine the effect of chemical composition, temperature and pH. The relation of this type of data to the use of fecal coliform bacteria as indicators of health hazard in water is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01250

ADSORPTION OF COLLOIDAL IRON BY BACTERIA,
Queensland Univ., Brisbane (Australia). Dept. of Microbiology.
I. C. Macrae, and J. F. Edwards.
Appl Microbiol. Vol 24, No 5, p 819-823. 1972, Illus.
Identifiers: *Adsorption, *Bacteria, Caulobacter, Colloidal iron, Corynebacterium-Pseudodiphtheriticum, Escherichia-Coli, *Iron, Klebsiella-Pneumoniae, Micrococcus, Mycobacterium-Phlei, Pseudomonas-Fluorescens.

The adsorption of iron from a positive-iron sol by species of 7 bacterial genera (Caulobacter, Micrococcus, Pseudomonas fluorescens, Mycobacterium phlei, Escherichia coli, Klebsiella pneumoniae and Corynebacterium pseudodiphtheriticum) was examined by electron microscopy. All species precipitated the iron from the sol and the bacterial cells became encrusted with iron. This was related to iron deposition in surface water supplied.--Copyright 1973, Biological Abstracts, Inc.
W74-01253

A WATERBORNE ACTINOMYCETE RESEMBLING STRAINS CAUSING MYCETOMA,
Unversity of the Witwatersrand, Johannesburg (South Africa).
E. N. Lawson, and L. M. Davey.
J Appl Bacteriol. Vol 35, No 3, p 389-394. 1972.
Identifiers: Actinomadura-Madurae, *Actinomycetes, *Mycetoma, *South Africa, Organic pollution.

An actinomycete, closely resembling strains of Actinomadura madurae causing mycetoma, was isolated from a stream in South Africa. The organism was present in all water samples collected monthly for 1 yr. It is considered to be indigenous in the stream because its population density was not influenced by water run-off from the soil into the stream or by organic pollution.--Copyright 1973, Biological Abstracts, Inc.
W74-01256

RELATIONSHIPS BETWEEN TURBIDITY AND HYDROGRAPHICAL FACTORS IN FRESH AND BRACKISH WATER REGION OF THE ELBE ESTUARY, (IN GERMAN),
I. Noethlich.
Arch Hydrobiol Supplement B. Vol 43, No 1, p 1-32. 1972, Illus, (English summary).
Identifiers: *Brackish water, *Germany (Elbe estuary), Hydrographical studies, Phytoplankton, *Turbidity, *Zooplankton, Estuaries.

For hydrographical reasons a turbidity zone is formed in the brackish-water region of the Elbe estuary, West Germany. This zone contains remains of the limnic production of phyto- and zooplankton as well as of marine sediments. The location of this zone is correlated with the inflow of fresh water from the river. The tidal currents as well as the amount of vertical turbulence are of great importance for the distribution of suspended matter. Much vertical turbulence, and also the morphology of the estuary bottom form patterns of suspended matter, which often drift to the surface building up clouds of turbidity. These patches are soon destroyed by waves and by the force of tidal currents.--Copyright 1973, Biological Abstracts, Inc.
W74-01260

THE OXYGEN STATUS OF LAKE SEDIMENTS,
For primary bibliographic entry see Field 02J.
W74-01266

LOSS OF PHOTOSYNTHETIC ACTIVITY IN TWO BLUE-GREEN ALGAE AS A RESULT OF OSMOTIC STRESS,
York Univ., Downsview (Ontario). Dept. of Biology.
B. Grodzinski, and B. Colman.
Journal of Bacteriology, Vol 115, No 1, p 456-458, July 1973. 1 fig, 1 tab, 11 ref.

Descriptors: *Cultures, *Photosynthesis, *Cyanophyta, Anabaena.
Identifiers: Culture media, *Anacystis, *Coccochloris, Mannitol, Gleocapsa, Oscillatoria.

Spheroplasts of the blue-green algae Anabaena flos-aquae, Anacystis nidulans, Gleocapsa alpicola, Coccochloris peniocystis, and Oscillatoria sp. were prepared using lysozyme in mannitol-phosphate buffer. Photosynthetic rates were determined for the spheroplasts in the mannitol-phosphate buffer, for untreated cells suspended in the same buffer, and for untreated cells suspended in phosphate buffer by manometric measurement of oxygen evolution or by measurement of C-14 uptake from labeled NaHCO3. No effects were noted for Anabaena, Oscillatoria, or Gleocapsa. However, with Anacystis and Coccochloris the photosynthetic rates for spheroplasts and cells in mannitol-phosphate buffer were much lower than that of cells in phosphate buffer. Washing of cells failed to produce recovery of photosynthetic activity and a fluorescent material identified as pteridine was found in the incubation medium. The quantity of pteridine was proportional to the loss of photosynthetic activity. Similar results were obtained with other compounds exerting osmotic pressure comparable to that of mannitol. These compounds were: sucrose, D-glucose, D-sorbitol, and fructose. (Little-Battelle)
W74-01302

NATURAL DISPERSION OF MERCURY FROM PUHIPUHI, NORTHLAND, NEW ZEALAND,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry.
F. E. Hoggins, and R. R. Brooks.
New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1-2, p 125-132, June 1973. 2 fig, 1 tab, 16 ref.

Descriptors: *Mercury, Ecological distribution, *Path of pollutants, *Pollutant identification, Chemical analysis, Oysters, Mussels, Soil analysis, Heavy metals, Pollutants, Mollusks, Aquatic soils, Sediments, Bottom sampling, Water sampling.
Identifiers: *New Zealand (Wairua River), Animal tissues, Cockles, Crassostrea glomerata, Paphies australe, Perna canaliculus, Wairoa River, Chione strutchburyi, Foot, Gills, Mantle, Shell, Viscera.

The mercury content of sediments and water in the Wairua (Wairoa) River, Northland, and of molluscs from the estuary of the river was determined to establish the extent of natural dispersion of mercury from deposits at the source of the river at Puhipuhi. The mercury content per gram wet weight of cockles, Chione stutchburyi, (0.032 ppm); rock oysters, Crassostrea glomerata, (0.081 ppm); pipi Paphies australe, (0.019 ppm); and green-lipped mussles, Perna canaliculus, (0.017 ppm) was compared with that of specimens of the same species from other areas where presumably only background concentrations exist. Mercury could be detected in sediments at least 35 km from the deposits, but in water only up to about 8 km. Normal background levels were established for the soft parts and individual organs of the four species of molluscs investigated; of the molluscs found in the estuary of the Wairua River, only C. glomerata had anomalous amounts of mercury, but whether this indicates abnormally high mercury levels in the environment is unknown, because many other factors still need to be evaluated. Mercury levels of all molloscs were well below the generally accepted safety level of 0.5 ppm for fish for human consumption. (Holoman-Battelle)
W74-01307

FATE OF LIGNIN IN KRAFT EFFLUENT TREATMENT,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
J. Ganczarczyk.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1898-1907, September 1973. 2 fig, 6 tab, 20 ref.

Descriptors: *Fibers (Plant), *Pulp wastes, *Activated sludge, *Sewage treatment, Waste water (Pollution), Effluents, Waste water treatment, Methodology, Aeration, Biological treatment, Chemical analysis, Chemical reactions, Industrial wastes, Organic compounds, Pollutant identification, Water analysis, *Sorption.
Identifiers: *Lignin, *Fate of pollutants, Biotransformation, Kraft black liquor, Indulin ATR solutions, Pollutant removal, Organic carbon, Methoxyl, Oxidative condensation.

The purpose of this study was to obtain additional experimental support for the hypothesis that the main mechanism of lignin removal in activated sludge treatment is by sorption, as well as to receive some insight into the possible chemical and biochemical transformations of lignin in this process. To achieve this purpose the aeration of kraft black liquor and indulin ATR solutions without any biological growth was studied. The laboratory experiments on activated sludge treatment of kraft black liquor solutions also were continued at very low loadings of aeration tanks and activated sludge. In addition, several chemical analyses of activated sludges from these experiments and from various technical installations were performed. The experiments showed that simple aeration of alkaline solution of kraft black liquor in the absence of biological growth and aeration of indulin ATR solutions precipitated some organic material and decreased pH, color, and nitrosolignin reaction possibly by oxidative condensation of lignin molecules. Lignin accumulated in sludge may be released into solution. Accumulation of lignin in the sludge may vary substantially. The accumulated material seems richer in methoxyl than the kraft lignin precipitate; thus, some selective transformation of lignin material may occur during activated sludge treatment. (Holoman-Battelle)

W74-01320

THE IMPORTANCE OF CHELATING AGENTS IN NATURAL WATERS AND WASTEWATERS,
Missouri Univ., Columbia.
S. E. Manahan, and M. J. Smith.
Water and Sewage Works, Vol 120, No 9, p 102-106, September 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Heavy metals, Waste water (Pollution), *Water analysis, *Pollutant identification, *Chelation, Nitrilotriacetic acid, Chemical analysis, Amino acids, Methodology, Water pollution, Humic acids, Metals, Water pollution sources, Iron, Manganese, Copper, Zinc, Cobalt, Nickel, Cadmium, Mercury, Lead, Pollutants, Ions, Sewage effluents.
Identifiers: *Chelating agents, Natural waters, *Metal chelates, Complexation, Detergent builders, Ethylenediaminetetraacetic acid, Atomic absorption spectrophotometry, Chemical interference, Sodium citrate, Polyphosphates, Polypeptides, Leucine, Valine, Alanine, Serine, Glutamic acid, Aspartic acid, Tyrosine, Histidine, Glycine, Cysteine, Ionic interference.

Chelation drastically changes the behavior of a metal ion in water. Some of the most important metals that form very stable chelates in water are Mn, Fe, Co, Ni, Cu, Zn, Cd, Hg, and Pb. Each of these must be considered in some way in the maintenance of water quality and the selection of suitable water supplies. Whether or not a particular chelating agent in water will chelate a given metal ion in water depends upon pH, the presence of species forming insoluble compounds with the metal, and the presence of metal ions which will compete for the chelating agent. Sources of chelating agents include detergent builders, proteinaceous wastes, sewage effluents and the naturally occurring plant degradation products, the humic acids. Whenever conventional wastewater treatment processes fail to remove metals, the presence of chelates should be considered. An atomic absorption method is presented for the analysis of heavy metal chelating agents in water and a brief discussion given of chemical interference, with special emphasis on iron interference. (Holoman-Battelle)
W74-01326

N-NITROSATION BY NITRITE ION IN NEUTRAL AND BASIC MEDIUM,
National Cancer Inst., Bethesda, Md. Div. of Cancer Cause and Prevention.
L. K. Keefer, and P. P. Roller.
Science, Vol 181, No 4106, p 1245-1247, September 1973. 1 fig, 23 ref.

Descriptors: *Water pollution effects, *Chemical reactions, Hydrogen ion concentration, Aqueous solutions, Nitrites, *Path of pollutants.
Identifiers: *Nitrosation, *Nitrosamines, *Carcinogens, Amines, N-nitrosation, Formaldehyde, Chloral, Diethylamine, Pyrrolidine, Piperidine, Dimethylamine, Di-n-propylamine, Diisopropylamine.

Studies with aqueous buffer solutions of diethylamine and sodium nitrite showed that formaldehyde catalyzed the production of diethylnitrosamine at room temperature over the entire pH range studied (pH 6.4 to 11.0). Additional studies with other secondary amines (pyrrolidine, piperidine, dimethylamine, di-n-propylamine, and diisopropylamine) showed that formaldehyde chloral catalyzed N-nitrosation of these compounds. A mechanism for the reaction is proposed and demonstrated. It is concluded that significant synthesis of N-nitroso compounds must be considered possible even in nonacidic media since formaldehyde, chloral, and other aldehydes are common industrial by-products or wastes. (Little-Battelle)
W74-01328

ETHYLENETHIOUREA DEGRADATION,
FMC Corp., Princeton, N.J. Niagara Chemical Div.
A. Cruickshank, and H. C. Jarrow.
Journal of Agricultural and Food Chemistry, Vol 21, No 3, p 333-335, May/June 1973. 3 fig, 4 tab, 11 ref.

Descriptors: *Degradation (Decomposition), *Hydrolysis, Environmental effects, Ultraviolet radiation, *Fungicides, Thiocarbamate pesticides, Hydrogen ion concentration, Aqueous solutions, Pollutant identification, Methodology, Carbamate pesticides, Stability, Temperature.
Identifiers: *Photolysis, *Ethylenethiourea, *Fate of pollutants, Degradation products, Silica gel, Photodecomposition, Bis (imidazolin-2-yl)sulfide, Photosensitizers, 1-Acetonaphthone, Eosin, 1-Naphthaldehyde, trans-Stilbene, Methylene blue, Flavone, Benzophenone, Benzil, Carbazole, 2-Imidazolidinethione, 2-Imidazolidone, Crystal violet, Thin layer chromatography, Chromogenic reagents, Autoradiography.

A laboratory study was conducted on the photolytic and hydrolytic degradation of ehtylenethiourea (ETU), an ethylenebisdithiocarbamate fungicide. Photolysis was studied on a solid substrate (silica gel) and in aqueous solution; hydrolysis was studied over a pH range of 5.0-9.0. Ultraviolet irradiation (above 285 nm) of ethylenethiourea (ETU) on silica gel gave 2-imidazolidone as the major identifiable product. Several other products were formed, of which only bis (imidazolin-2-yl) sulfide has been identified. The 2-imidazolidone does not appear to undergo further degradation under these conditions. Decomposition of ETU is rapid, particularly in the presence of photosensitizers. Aqueous solutions of ETU undergo a very slow photolysis, which is markedly accelerated by sensitizers. ETU is stable to hydrolysis over the pH range 5.0 to 9.0 at 90C. (Holoman-Battelle)
W74-01340

SEASONAL VARIATION OF CHEMICAL PARAMETERS IN ALASKAN TUNDRA LAKES,
Skidmore Coll., Saratoga Springs, N. Y. Dept. of Biology.
H. H. Howard, and G. W. Prescott.
American Midland Naturalist, Vol 90, No 1, p 154-164, July 1973. 2 fig, 3 tab, 37 ref.

Descriptors: Tundra, *Water chemistry, *Alaska, Water sampling, Chemical analysis, Supersaturation, Chemical properties, Water properties, Shallow water, Lakes, Alkalinity, Dissolved oxygen, Bicarbonates, Hydrogen ion concentration, Chlorides, Hardness (Water), Calcium, Magnesium, Sulfates, Calcium carbonate, Methodology, *Ice cover, Thawing, Water analysis, Water quality.
Identifiers: Imikpuk Lake (Alas), Ikroavik Lake (Alas), *Seasonal variation, *Tundra lakes.

Chemical parameters were monitored for 20 months in two shallow lakes near Barrow, Alaska. After formation of an ice cover, all parameters, except dissolved oxygen and pH, increased to a maximum at time of maximum ice depth. The pH values were essentially the inverse of other parameters after an ice cover was formed. Dissolved oxygen increased to supersaturation values in January and then gradually decreased until photosynthetic rates became significant. The lakes did not become anaerobic at any time. During and immediately after thawing, dissolved oxygen was near saturation and all other solutes (except pH) fell to minimum values. After this low point, concentrations began to increase toward another maximum in the following year. Solutes may be concentrated up to about 30 times by the thick ice cover. Ratios of solutes deviated widely from mean world values, probably because of the close proximity of the lakes to the ocean. Imikpuk, nearer to the ocean, had most ratios closer to ocean values. Seasonally, except at the time of the thaw, ratios were essentially constant except for Cl/HC03. Cl/HC03 decreased after ice formation and until photosynthetic rates became significant. During ice melt, ratios differed from values at other times, possibly because of differential occlusion of solutes in ice. (Holoman-Battelle)
W74-01347

STUDIES OF RAPID NTA-UTILIZING BACTERIAL MUTANT,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
D. Liu, P. T. S. Wong, and B. J. Dutka.
Journal Water Pollution Control Federation, Vol 45, No 8, p 1728-1735, August 1973. 6 fig, 14 ref.

Descriptors: *Nitrilotriacetic acid, *Microbial degradation, *Cultures, *Pseudomonas, *Absorption, *Respiration, Bioassay, Waste water (Pollution), Oxidation, Separation techniques, Systematics, Isolation.
Identifiers: Ion transport.

A bacterial mutant with high affinity for NTA was isolated from wastewater after ultraviolet mutagenization and penicillin selection. Isolates were cultured in an NTA solution to study respiration, uptake (with C-14-labeled NTA), and morphological and biochemical characteristics. Specimens were examined by electron microscopy. Morphological and biochemical characteristics of the mutant suggest that it is a Pseudomonas sp. The rate and amount of oxygen utilization is a function of NTA concentration with 99 percent of an initial concentration of 514 mg NTA/l being oxidized within 3 hours. Optimum degradation occurs at 25 C and is significantly lowered at 10 and 4C. The mutant prefers NTA to wastewater with the rate of oxidation 5 times faster with NTA than with wastewater. The uptake studies suggest that NTA might enter the mutant via a specific transport protein. (Little-Battelle)
W74-01348

PEAT FLOATING IN THE RESERVOIR OF THE KIEV HYDROELECTRIC STATION AND ITS ROLE IN WATER CONTAMINATION, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Insytut Botaniki.
L. S. Balashov.
Ukr Bot Zh., Vol 29, No 1, p 49-54. 1972. Illus. (English summary).
Identifiers: Alder, Contamination, Dryopteris-Thelypteris, Electric power, *Peat, Phragmites, Communis, Reservoirs, Seasons, Sphagnum, Typha-Angustifolia, *USSR (Kiev hydroelectric station), Willow.

In 1967-1968, islands of the upper layer of peat deposits (up to 0.5 m) were observed near the western shoreline within the limits of the Chernobyl district (USSR); in 1969-1970, islands existing for some years (peat thickness: up to 1.5-2.0 m) as well as peat island annually floating and sinking in autumn were found. Weak- and medium-decayed peat containing Sphagnum remains come to the surface from depth of 0.7-1.0 up to 2.5-3.0 m, in the area of some m2 to 0.15-0.2 ha. Floating occurs in the second half of summer. The plant cover consists of rhizome herbs, annuals are less frequent. On the perennial islands there occurs sprout adler and willow with thickets of Phragmites communis, Dryopteris thelypteris and Typha angustifolia. Preventive measures are necessary against peat floating before reservoir is built (clearing of bed).--Copyright 1973, Biological Abstracts, Inc.
W74-01352

MERCURY IN THE ENVIRONMENT--A GLOBAL REVIEW INCLUDING RECENT STUDIES IN THE DELAWARE BAY REGION,
Delaware Univ., Newark. Coll., of Marine Studies.
F. K. Lepple.

Available from NTIS, Springfield, Va 22151, COM-73-10620 Price $3.00 printed copy; $1.45 microfiche. Report DEL-SG-8-73, March 1973. 75 p, 3 fig, 7 tab, 153 ref. NOAA-SG-3-35223.

Descriptors: *Water pollution sources, *Mercury, *Surface waters, *Sediments, *Delaware, Bays, Atmosphere, Toxicity, Chemical analysis, Analytical techniques, Data collections, Sampling, Environmental effects, Environmental control, Evaluation, Oceans, Rivers.
Identifiers: *Delaware Bay region.

The first section of this two-part report reviews basic properties of mercury and its compounds as related to their effect on various facets of the environment. Among the topics discussed are the chemical forms and hazards of mercury, incidents of mercury contamination, governmental standards and tolerance limits, levels of mercury in the atmosphere, biosphere, lithosphere and hydrosphere, and the flux through each segiment. The reality of the 'mercury problem' globally and locally is evaluated. A comprehensive review of the accepted methods of analyses for mercury and its compounds is also presented. The second section reports on recent studies of mercury levels in the Delaware Bay region and compares the concentrations found in the waters and sediments to values from other areas. Mercury levels tend to decrease near the mouth of the bay and again reach minimum value of 0.1 ppb near Dewey Beach, approximately 8 miles south of Cape Henlopen. Relatively high concentrations (0.4 to 0.5 ppb mercury) were in the region near the center of the bay. (Woodard-USGS)
W74-01373

CONTRIBUTION TO BIOLOGICAL AND CHEMICAL STUDY OF THE PORT OF OSTENDE, (IN FRENCH),
Brussels Univ. (Belgium). Laboratorium voor Ekologie en Systematiek.
J. Podamo.
Ann Soc R Zool Belg. Vol 102, No 1/2, p 105-127. 1972, Illus, (English summary).
Identifiers: Bacteria, *Belgium (Ostende harbor), *Biological studies, *Chemical studies, Phytoplankton, Pollution, Ports, Zooplankton, Harbors, Sampling, Outfall sewers, Water stratification, Water pollution sources.

A biological and chemical study was made on the harbor of Ostend (Belgium). The harbor was surveyed on the 6th of Aug. 1970 at low water and high water. Samples were taken at various depths for chemical analysis, bacteriological, phytoplankton and zooplankton investigations. All the results demonstrate an obvious water stratification and heavy pollution by sewage outfalls and inland water.--Copyright 1973, Biological Abstracts, Inc.
W74-01384

A STUDY OF THE EXCHANGE OF DISSOLVED SOLIDS BETWEEN BOTTOM SEDIMENTS AND WATER OF DIFFERENT WATER BODIES (IZUCHENIYE OBMENA RASTVORENNYMI VESHCHESTVAMI MEZHDU DONNYMI OTLOZHENIYAMI I VODOY RAZLICHNYKH VODOYEMOV),
Moscow State Univ. (USSR). Chair of Hydrology.
For primary bibliographic entry see Field 02J.
W74-01389

CONCENTRATIONS OF DISSOLVED FORMS OF FE, MN, AND CU IN MARINE PORE WATERS OF THE ATLANTIC BASIN (KONTSENTRATSII RASTVORENNYKH FORM FE, MN, I CU V MORSKIKH, POROVYKH VODAKH BASSEYNA ATLANTICHESKOGO OKEANA),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
For primary bibliographic entry see Field 02K.
W74-01392

CHLORINATED HYDROCARBON INSECTICIDES IN SEDIMENTS OF SOUTHERN LAKE MICHIGAN,
Illinois Univ., Urbana. Dept. of Civil Engineering.
H. V. Leland, W. N. Bruce, and N. F. Shimp.
Environmental Science and Technology, Vol 7, No 9, p 833-838, September 1973. 7 fig, 1 tab, 22 ref.

Descriptors: Sediments, *DDT, *Distribution patterns, *Organic matter, Particle size, Particle shape, DDD, DDE, Dieldrin, *Degradation (Decomposition), *Lake Michigan, *Gas chromatography, Sampling, Statistical methods, Separation techniques, Laboratory equipment, *Lake sediments.
Identifiers: Lindane, Heptachlor epoxide, Sample preservation, Sample preparation, Dechlorination, Electron capture detectors.

A profile was developed of the extent of chlorinated hydrocarbon contamination of sediments of southern Lake Michigan, and factors affecting t-DDT distribution and DDT degradation are discussed. Sediments were collected with a Shipek grab or a Benthos gravity corer. Temperature, pH, AND ELECTRODE POTENTIAL WERE DETERMINED IMMEDIATELY. Samples which were frozen until analysis, were thawed, drained of excess water, and subsampled for particle-size and insecticide determinations. A remaining portion was air-dried and used for total and inorganic carbon determinations. Samples were extracted with acetone, cleaned up by passage through a Fluorisil column, and analyzed for chlorinated hydrocarbon insecticides using a Varian Aerograph 204 with an Ni-63 electron-capture detector and glass column containing 1.95 percent QF-1 and 1.5 percent OV-17 on Supelcoport 100-120 mesh Chromosorb at 195 C. The pesticides identified were DDT, DDD, DDE, dieldrin, and traces of lindane and heptachlor epoxide. Statistical analysis showed high positive correlations between t-DDT (DDT, DDE, DDD) and dieldrin concentrations in the sample and organic carbon content. The amount of organic carbon in surficial sediments was directly proportional to the clay-size fraction of sediment. Dechlorination of DDT to form DDD apparently predominates under the reducing conditions of sediments on the eastern side of the south basin of Lake Michigan. In other areas, DDT is the principal component of the t-DDT complex in sediments and DDE and DDD are major degradative products. (Little-Battelle)
W74-01397

LIGAND PHOTOOXIDATION IN COPPER (II) COMPLEXES OF NITRILOTRIACETIC ACID. IMPLICATIONS FOR NATURAL WATERS,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
C. H. Langford, M. Wingham, and V. S. Sastri.
Environmental Science and Technology, Vol 7, No 9, p 820-822, September 1973. 3 fig, 14 ref.

Descriptors: *Aqueous solutions, *Copper, *Nitrilotriacetic acid, Path of pollutants, Heavy metals, Carbon dioxide, Irradiation, Spectrophotometry.
Identifiers: *Fate of pollutants, *Photodecomposition, Iminodiacetic acid, Formaldehyde, Thin layer chromatography, Actinometry.

Solutions of Cu-NTA complex were prepared from stock solutions of Cu (II) and H3NTA and irradiated in a Rayonet photoreactor for 100 minutes to study their photodecomposition. Despite low absorptivity of the complexes, significant decomposition occurred with the production of formaldehyde, iminodiacetic acid, and carbon dioxide (by inference). The quantity of photodecomposition was estimated by spectrophotometric determination of the formaldehyde produced. Iminodiacetic acid was determined by thin-layer chromatography. The quantum yield, as determined by ferrioxalate actinometry decreases linearly with increasing pH over the range of 2-12. The efficiency of photodecomposition decreases with increasing concentration above 0.001 M but approaches a limiting value below about 0.0005 M. The low concentration limit of the efficiency of decomposition is approximately 1.0. There is no direct evidence for the intervention of Cu (I) species although a photoredox pathway involving Cu seems the most plausible mechanism. (Little-Battelle)
W74-01400

PATHWAYS OF TRACE ELEMENTS IN ARCTIC LAKE ECOSYSTEMS,
Alaska Univ., College. Inst. of Marine Science.
R. J. Barsdate.
Available from NTIS Springfield, Va., 22151, as RLO-2229-T2-1 for $3.00 paper copy $1.45 microfiche. Progress Report No. RLO-2229-T2-1, 1972. 87 p, 19 fig, 15 tab, 57 ref. Contract No. AT (45-1)-2229 No. 2.

Descriptors: *Trace elements, *Phytoplankton, Tundra, Ponds, Lakes, Ecosystems, *Path of pollutants, *Water pollution effects, Humic acids, Phytotoxicity, Heavy metals, Lake sediments, Pollutant identification, Biomass, Primary productivity, Bioassay, Alkaline earth metals, Water analysis, Chemical analysis, Cycling nutrients, Plant tissues, Zinc, Lead, *Alaska, Aquatic algae, Food webs, Food chains, Copper, Silica, Chrysophyta, Cobalt, Manganese, Chlorophyta, Pyrrophyta, Cyanophyta, Calcium, Magnesium, Strontium, Surface waters, Eutrophication, Methodology, Electrochemistry, Sediments, Dinoflagellates, Color, Diatoms, Euglenophyta, Laboratory tests, Absorption, Lagoons, Standing crops, Limiting factors.
Identifiers: *Metals complexes, Natural organics, Chemical composition, Phosphorus cycle, Bioaccumulation, Fate of pollutants, Dissolved carbon, Dissolved nitrogen, Dissolved copper, Dissolved silica, Rhodomonas minuta, Dissolved organic carbon, Zostera marinus, Sensitivity.

The primary emphasis of this report is the interactions between planktonic algae and trace metals (principally zinc) in solution as related to lake ecosystems in the Arctic. Distinctions were made, where possible, between pathways and effects of metals in simple ionic forms and those bound to naturally occurring organic ligands. The results from studies of tundra pond waters indicate that increases in metal concentrations may be responsible for the absence of fall phytoplankton blooms and a dramatic shift in phytoplankton population from Rhodomonas minuta to Chrysophyta. In lakes with high natural concentrations of humic complexing agents there was a pronounced suppression of phytoplankton production by the addition of trace metals. This suggested that such complexed metals are available physiologically to phytoplankton. The shallow marine or estuarine lagoons bordering the Bering Sea have vast eelgrass meadows which are responsible for exporting substantial quantities of dissolved C, N, P, Cu, and silica; Pb is also removed but in smaller quantities. The somewhat detailed study of zinc showed that in organic-rich lakes, a large fraction of the total Zn is in the form of dissolved complexes or colloidal complexes, and a smaller fraction is in simple inorganic forms. Precision in the determination of complexed zinc is considered to be extremely important. (Holoman-Battelle)
W74-01401

LEAVES AS SOURCE OF PHOSPHORUS,
Wisconsin Univ., Madison. Water Chemistry Program.
W. F. Cowen, and G. F. Lee.
Environmental Science and Technology, Vol 7, No 9, p 853-854, September 1973. 3 tab, 6 ref.

Descriptors: *Leaves, *Water pollution sources, *Phosphorus, *Oak trees, Model studies, *Urban runoff, Nutrients, Leaching, Sampling,

Colorimetry, Pollutant identification, Color reactions, Methodology.
Identifiers: *Poplar trees, Sample preparation, Soluble phosphorus.

Oak and poplar leaves were leached with distilled water in laboratory columns to simulate the release of soluble phosphorus (P) forms to urban runoff. Most of the soluble phosphorus leached was reactive in a molybdenum blue analysis. The leaves tested yielded 54-230 micrograms P/g of leaves. Consecutive leachings of an oak leaf sample yielded soluble P in amounts related to the effective soaking period between leachings and to the number of proceding leachings. Cut up leaves released almost three times as much soluble P as intact leaves. Leaves collected from the littoral zone of Lake Mendota leached less P than control leaves collected on the shore nearby. The moisture retained on leaves after a rainstorm contained significant soluble reactive P. The results point to the importance of proper leaf pickup and control in order to minimize the phosphorus content of urban drainage during the fall of the year. (Holoman-Battelle)
W74-01407

RELATION BETWEEN TOTAL BODY WEIGHT AND CONCENTRATIONS OF MANGANESE, IRON, COPPER, ZINC, AND MERCURY IN WHITE MUSCLE OF BLUEFISH (POMATOMUS SALTATRIX) AND A BATHYL--DIMERSAL FISH ANTIMORA ROSTRATA,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
F. A. Cross, L. H. Hardy, N. Y. Jones, and R. T. Barber.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1287-1291, September 1973. 1 fig, 2 tab, 19 ref.

Descriptors: *Size, *Weight, *Heavy metals, Iron, Copper, Zinc, Mercury, Chemical analysis, Pollutant identification, Marine fish, Deep-water habitats, Demersal fish, Trace elements.
Identifiers: *Muscle, Bioaccumulation, *Bluefish, *Morids, Chemical concentration, Animal tissues, Pomatomus saltatrix, Antimora rostrata.

The purpose was to compare the relation between total body weight and concentrations of Hg with that of four biologically-essential transition metals (Mn, Fe, Cu, and Zn) in white muscle of two species of marine fish that inhabit different environments in the Atlantic Ocean. These species were bluefish (Pomatomus saltatrix), an epipelagic carnivore found in coastal waters of the western Atlantic Ocean, and a bathyl-demersal morid Antimora rostrata collected from 2500-m depth. The mercury concentrations increased significantly with size (P less than 0.001) in both species of fish but concentrations of Mn, Fe, Cu, and Zn either remained constant or decreased. These results indicated that fish residing in two different ecosystems in the Atlantic Ocean may be in a steady state with their environment with respect to Mn, Fe, Cu, and Zn but not Hg. The observed variations in accumulation patterns of trace metals in muscle of these two species as a function of size are discussed. (Holoman-Battelle)
W74-01413

DETERMINATION OF MELEIC HYDRAZIDE RESIDUES IN TOBACCO AND VEGETABLES,
Department of Agriculture, Ottawa (Ontario). Chemistry and Biology Research Inst.
For primary bibliographic entry see Field 05A.
W74-01418

SALINITY ADAPTATION BY DUNALIELLA TERTIOLECTA. I. INCREASES IN CARBONIC ANHYDRASE ACTIVITY AND EVIDENCE FOR A LIGHT-DEPENDENT NA (PLUS)/H (PLUS) EXCHANGE,
State Univ. Coll., Geneseo, N.Y. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01427

DIATOM ASSOCIATIONS IN YAQUINA ESTUARY, OREGON : A MULTIVARIATE ANALYSIS,
Oregon State Univ., Corvallis. Dept. of Botany.
C. D. McIntire.
Journal of Phycology, Vol 9, No 3, p 254-259, September 1973. 2 fig, 5 tab, 13 ref.

Descriptors: *Diatoms, *Bioindicators, Distribution patterns, *Oregon, Statistical methods, Sampling, Salinity, Seasonal.
Identifiers: Data interpretation, *Yaquina Estuary (Ore.), *Cluster analysis, Principal components analysis, Species diversity, *Multivariate analysis.

In August 1968 and February 1969, 15,445 diatom cells were collected from several sites in the Yaquina Estuary, identified and counted, and the data subjected to cluster analysis and principal components analysis. The purpose of the analysis was to examine the degree to which the diatom flora can be partitioned into discrete associations and to relate their composition to selected physical properties of the estuary. Samples were collected with PVC sampling devices attached to pilings. The results show that the species composition of the diatom flora during the winter was more closely associated with salinity and intertidal exposure than in the summer. A cluster of freshwater taxa obtained for the winter data was the most conspicuous diatom association defined by the cluster analysis. Although taxa within a cluster had more similar distributions than taxa from different clusters, there was considerable variation in the distributions of marine and brackish water taxa within a multispecies cluster. (Little-Battelle)
W74-01430

KINETICS OF SILICON-LIMITED GROWTH IN THE MARINE DIATOM THALASSIOSIRA PSEUDONANA HASLE AND HEIMDAL (EQUALS CYCLOTELLA NANA HUSTEDT),
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05C.
W74-01431

SUPERSATURATION OF NITROGEN IN WATER DURING PASSAGE THROUGH HYDROELECTRIC TURBINES AT MACTAQUAC DAM,
Environmental Protection Service, Halifax (Nova Scotia).
For primary bibliographic entry see Field 05C.
W74-01432

PROBABLE CAUSES FOR THE 1972 RED TIDE IN THE CAPE ANN REGION OF THE GULF OF MAINE,
New Hampshire Univ., Durham. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-01435

COUPLING CARBON FLOW THROUGH SOME PELAGIC AND BENTHIC COMMUNITIES,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
B. T. Hargrave.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1317-1326, September 1973. 3 fig, 3 tab, 48 ref.

Descriptors: *Primary productivity, *Oxygen demand, *Sediments, *Carbon, *Photosynthesis, *Regression analysis, Data processing, Correlation analysis.
Identifiers: Organic carbon.

Undisturbed sediment cores (10-15 cm long) were taken with 300-500 ml overlying water using a Kajak corer for measurement of oxygen uptake and organic carbon to attempt to relate to two values. Multiple linear regression was used to evaluate the effects of total water column depth, mixed-layer depth, temperature at sediment surface, and carbon supply (primary production) on oxygen uptake by sediment cores from various lakes, bays, and coastal areas for which mean annual estimates are available. Sediment core oxygen uptake was found to be correlated positively with primary production and inversely with mixed-layer depth in various aquatic ecosystems for which the input of organic matter is predominantly autochthonous. In these areas organic carbon sedimentation is proportional to the ratio of carbon input: mixed-layer depth which reflects increased mineralization with increased depth of mixing. The ratio of primary production: mixed-layer depth is compared with the carbon equivalent of exygen uptake by sediments to derive an expression which is used to calculate the amount of photosynthetically fixed carbon respired at the sediment surface. (Little-Battelle)
W74-01437

SAND BEACH BACTERIA: ENUMERATION AND CHARACTERIZATION,
American Univ., Beirut (Lebanon). Dept. of Biology.
For primary bibliographic entry see Field 05A.
W74-01444

MURFEE V. PHILLIPS PETROLEUM COMPANY (ACTION BY PROPERTY OWNERS AGAINST OIL AND GAS LESSEES FOR DIMINUTION OF MARKET VALUE OF LAND DUE TO POLLUTION OF UNDERGROUND FRESH WATER SUPPLY).
For primary bibliographic entry see Field 06E.
W74-01459

DRINKING WATER,
For primary bibliographic entry see Field 05F.
W74-01466

PHYTOPLANKTON NUTRIENTS AND FLUSHING OF INLETS ON THE COAST OF NOVA SCOTIA,
Bedford Inst., Datrmouth (Nova Scotia). Marine Ecology Lab.
T. Platt, A. Prakash, and B. Irwin.
Nat Can (Que). Vol 99, No 4, p 253-261. 1972. Illus.
Identifiers: *Canada (Nova Scotia coast), Coasts, *Flushing, Inlets, *Nutrients, *Phytoplankton.

In 2 inlets 35 km apart on the Atlantic coast of Nova Scotia, Canada, fluctuations of phytoplankton nutrients during 1967 were strikingly similar. It is concluded that, except during the spring bloom, nutrient levels in the inlets on this coast are controlled more by water movements on the continental shelf than by biological processes within the inlets. Flushing of the inlets is more extensive in late summer and autumn. Water replacement occurs every year on this coast and the flushing takes place on a broad front rather than affecting isolated inlets.--Copyright (c) 1973, Biological Abstracts, Inc.
W74-01471

APPLICATION OF MATHEMATICAL MODELLING TO WATER QUALITY MANAGEMENT,
EASAMS, Camberley (England).
J. G. Mellor, and N. C. Oxley.
Effluent and Water Treatment Journal, Vol 13, No 8, p 47-479, August 1973. 2 fig, 4 tab, 2 ref.

Descriptors: *Water quality, *Monitoring, *Management, River systems, *Pollution abatement, *Mathematical models, Systems analysis, Decision making, Biochemical oxygen demand, Dissolved oxygen, Water resources.

Identifiers: *River Itchen (Hampshire-England), *Ammoniacal nitrogen decay.

A quality model is the framework upon which more comprehensive mathematical models of water quality control systems can be developed where the economics of alternative water quality improvement measures are considered. It is essential that all water quality management decisions be based on an accurate description of the quality system itself, and the river basin must be treated as one interrelated system. Needed is a precise, descriptive, predictive model for monitoring river water quality, enabling quick and rational water quality decisions; the model should be based on existing information and consider all constituents (not only DO and BOD) which may have undesirable or toxic effects at even very low levels of concentration. Recognizing the uniqueness of cause and effect relationships in any system, the model can be developed at a simple level incorporating those processes directly affecting water quality. Such a model can be developed from the statistical treatment of water quality data collected on a routine basis by any river authority. This technique is described in its application to the state of ammoniacal nitrogen in the River Itchen in Hampshire, England. (Bell-Cornell)
W74-01486

THERMAL AND BASE-CATALYZED HYDROLYSIS PRODUCTS OF THE SYSTEMIC FUNGICIDE, BENOMYL,
California Univ., Davis. Dept. of Environmental Toxicology.
E. R. White, E. A. Bose, J. M. Ogawa, B. T. Manji, and W. W. Kilgore.
Journal of Agricultural and Food Chemistry, Vol 21, No 4, p 616-618, July/August 1973. 4 fig, 7 ref.

Descriptors: *Hydrolysis, *Chemical degradation, *Spectroscopy, Carbamate pesticides, Pollutant identification, Synthesis, Methodology, Solubility, Fungicides, Chemical reactions, Isolation, Pollutants.
Identifiers: *Degradation products, *Benomyl, Methyl 2-benzimidazole carbamate, *Spectral analysis, 1 2 3 4-Tetrahydro-3-butyl-2 4-dioxo-s-triazino (a)benzimidazole, 1- (2-Benzimidazolyl)-3-n-butyl urea, Fate of pollutants, Chemical structure, Thin layer chromatography, Methyl 1- (butylcarbamoyl)-2-benzimidazole carbamate, Infrared spectra, Infrared spectrophotometry, MBC, NMR spectra, Mass spectra, STB, BBU, Characterization.

The chemical fate of benomyl (methyl 1- (butylcarbamoyl)-2-benzimidazolecarbamate) fungicide in practical use situations was investigated. Conversion products were isolate, purified, and subsequently subjected to a number of spectroscopic techniques appropriate for structural characterization. Synthesis routes for obtaining otherwise unavailable reference standards of hydrolysis products are described and a degradative pathway of benomyl to these conversion products is proposed. (Holoman-Battelle)
W74-01504

ALGAL EXCRETION OF C-14-LABELED COMPOUNDS AND MICROBIAL INTERACTIONS IN CYANIDIUM CALDARIUM MATS,
Wisconsin Univ., Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 05C.
W74-01510

MECHANISM OF NTA DEGRADATION BY A BACTERIAL MUTANT,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
P. T. S. Wong, D. Liu, and D. J. McGirr.
Water Research, Vol 7, No 9, p 1367-1374, September 1973. 3 fig, 2 tab, 22 ref.

Descriptors: *Nitrilotriacetic acid, *Microbial degradation, *Kinetics, Bacteria, Cultures, Bioassay, Radioactivity techniques, Absorption.
Identifiers: *Transport, *Metabolites, *Bioaccumulation, Scintillation counting, Sample preparation, Exchange diffusion, Glycine, Acetic acid.

A bacterial mutant which was found previously to degrade NTA was used to investigate the mechanism and conditions of NTA degradation. Energy requirements for NTA transport were investigated by measuring the rate and level of uptake of C-14-labeled NTA by untreated bacteria and bacteria treated with sodium azide or potassium cyanide to abolish energy production in the cells. The results suggest that energy is involved in NTA transport and the bacteria can concentrate NTA from environments in which it may be otherwise too dilute for growth. An attempt was made to identify metabolic products of NTA degradation by exchange diffusion which involved labeling cells with C-14 NTA; exposing them to unlabeled NTA, IDA, succinate, citrate, glycine, and acetate; and measuring the change in C-14 NTA content of the cells. The results suggest that glycine and acetate may be intermediates of NTA degradation, and the other compounds are either transient intermediates or not produced. The mutant was able to degrade NTA from an initial concentration of 290,000 micrograms/l to less than 50 micrograms/l in 45 min, representing a degradation rate of 486 micrograms/hour/mg dry weight of cells. This result was substantiated by kinetic studies which gave a Km of 82 micrograms/l and a V sub max of 370 micrograms/hour/mg dry weight cells. Maximal degradation occurred at 50 C. The ability of the mutant to metabolize NTA resides mainly in the cell membrane fraction. (Little-Battelle)
W74-01515

SR-87/SR-86 RATIOS AND TOTAL STRONTIUM CONCENTRATIONS IN SURFACE WATERS OF THE SCIOTO RIVER DRAINAGE BASIN, OHIO,
Miami Univ., Oxford, Ohio. Dept. of Geology.
J. B. Curtis, Jr., and A. M. Stueber.
The Ohio Journal of Science, Vol 73, No 3, p 166-175, May 1973. 4 fig, 2 tab, 12 ref.

Descriptors: *Water analysis, *Strontium, *Tracers, *Monitoring, Mass spectrometry, Water pollution sources, Sampling, Separation techniques, Radioisotopes, Strontium radioisotopes, *Ohio.
Identifiers: *Scioto River (Ohio), Sr-86, Sr-87, Background levels, Atomic absorption spectrophotometry, Ion exchange chromatography.

Water samples were collected from 16 locations on the Scioto River to determine whether variations exist in Sr-87/Sr-86 ratios, to evaluate the effects of rock types on the ratios, and to evaluate the effect of input from tributaries on isotopic composition. Samples were collected from the Scioto River above and below tributary confluences and from tributaries above their confluence with the Scioto. Polyethylene containers were used to store the samples until determination of Sr by atomic absorption spectrophotometry. Sr was separated from water by cation-exchange chromatography, and isotopic compositions were determined on a solid-source mass spectrometer. Total Sr concentrations were quite variable and, in the northern portion of the basin, they were unusually high compared to most North American rivers, probably due to to weathering of celestite in the Silurian carbonate bedrock and overlying glacial till. The Sr-87/Sr-86 ratios of the Scioto River throughout its length are constant at about 0.7084, whereas tributaries have a range of values from about 0.708 to about 0.715. The effect of bedrock on the strontium-isotopic compositions of these waters is apparently superseded by the effect of readily soluble carbonate and celestite in the glacial till. Based on this survey, application of the Sr-87/Sr-86 ratio as a tracer of surface-water provenance in Ohio should be restricted to unglaciated terrain. (Little-Battelle)
W74-01516

BENTHIC MACROINVERTEBRATES AS INDEXES OF WATER QUALITY IN WHETSTONE CREEK, MORROW COUNTY, OHIO (SCIOTO RIVER BASIN),
Akron Univ., Ohio.
J. H. Olive, and C. A. Dambach.
The Ohio Journal of Science, Vol 73, No 3, p 129-149, May 1973. 4 fig, 1 tab, 58 ref.

Descriptors: *Benthic fauna, *Bioindicators, *Water quality, *Systematics, Animal groupings, Water pollution, Water pollution sources, Crustaceans, Waste water (Pollution), Aquatic insects, Water properties, Biological properties, Bottom sampling, Water analysis, Annelids, Mollusks, *Ohio, Invertebrates, Brines, Storm runoff, Domestic wastes, Sewage effluents, Sewage treatment, Treatment facilities, Septic tanks, Water sampling.
Identifiers: *Macroinvertebrates, *Whetstone Creek (Ohio), Species diversity index, Species diversity, Community-ordination technique, Flatworms, Shannon-Wiener diversity index, Leeches, Chironomids, Sampling techniques, Turbellaria, Scuds, Black flies, Bugs, Pelecypoda, Pouch snails, Alderflies, Water boatmen, Small water striders, Predaceous diving beetles, Whirling beetles, Crawling water beetles, Water scavenger beetles, Anthomyiid flies, Long-legged flies, Dance flies, Shore flies, Biting midges, Flower flies, Horse flies.

During the summer of 1966, Whetstone Creek, a tributary of the Olentangy River in central Ohio, received (1) domestic wastes from a secondary sewage-treatment plant at Mt. Gilead, (2) septic-tank drainage near Cardington, (3) brines from oil-field operations between Mt. Gilead and Cardington, and (4) stormwater runoff from agricultural lands. Dissolved-oxygen levels as low as 4.3 ppm and total-phosphate concentrations as high as 4.2 ppm were noted 1 km below Mt. Gilead. Chlorides ranging from 105-276 ppm were recorded in the stream between Mt. Gilead and the Delaware Reservoir. Seventy-nine taxa of benthic macroinvertebrates were collected from six sampling locations. The largest variety of organisms (35-39 respectively) was taken from a relatively unpolluted headwater area and from a site 1 km below the Mt. Gilead wastewater-treatment facility. Average Shannon-Wiener diversity indexes exceeded 3.0 at the uppermost sampling station and at two locations 7-15 km below Mt. Gilead. Values less than 2.0 were recorded 9 km above Mt. Gilead and at the lowermost station near the Delaware Reservoir. Low Shannon-Wiener diversity indexes for the latter two areas appear to be related to low diversity of habitat and temporal effects, rather than to poor water quality. Pollution-sensitive and facultative organisms, including certain chironomids, stoneflies, mayflies, caddisflies, and gill-bearing snails, accounted for 98 percent of the benthic organisms collected from upstream stations. Pollution-tolerant tubificids, leeches, certain chironomids, and pulmonate snails increased in abundance and percentage composition at all stations below Mt. Gilead, accounting for as much as 50-60 percent of the benthic community at the lowermost station. (Holoman-Battelle)
W74-01517

SOME EFFECTS OF FILTRATION ON THE DETERMINATION OF NUTRIENTS IN FRESH AND SALT WATER,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
For primary bibliographic entry see Field 07B.
W74-01521

PARTICULATE METALS IN WATERS OF SORFJORD WEST NORWAY,
Edinburgh Univ. (Scotland). Grant Inst. of Geology.
J. M. Skei, N. B. Price, and S. E. Calvert.
AMBIO, Vol 11, No 4, p 122-124, 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Distribution patterns, *Path of pollutants, Suspended solids, Dispersion, *Copper, *Lead, *Zinc, *X-ray analysis, Water pollution sources, Water pollution effects, Heavy metals, Industrial wastes, Water analysis, Estuaries, Sea water, Runoff, Separation techniques, Sampling.
Identifiers: *Norway (Sorfjord), Background levels, Particulate matter, Sample preparation.

Water samples were collected in PVC/nylon water bottles from various depths at eight stations on the Sorfjord, West Norway, filtered through membrane filters, and the Cu, Zn, Pb content of suspended matter determined by x-ray emission analysis. The purpose of the study was to trace the dispersal pattern of metal-containing waste discharged by industrial plants near the town of Odda. The concentrations of the metals in the fjord, especially Zn and Pb, are up to two or three times higher than in natural seawater. Metals have been detected in both surface and subsurface waters 40 km away from the area of metal discharge. Considering the hydrography and the relationship of Zn and Pb in different waters, it seems possible that two distinct bodies of contaminated water outflow from the fjord. However, during periods of high river runoff, the dispersal of metals in subsurface waters will be different, and it is predicted that at such times pollution of the inner fjord will be greatest. (Little-Battelle)
W74-01528

DISTRIBUTION OF (C-14) PCBS IN CARP,
Tokyo Univ. of Fisheries (Japan).
For primary bibliographic entry see Field 05C.
W74-01530

BOTTOM FAUNA AS AN INDICATOR OF WATER QUALITY IN SWEDEN'S LARGE LAKES (LAKES MALAREN, VATTERN AND VANERN),
Uppsala Univ. (Sweden). Inst. of Zoology.
T. Wiederholm.
AMBIO, Vol 11, No 4, p 107-110, 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Benthic fauna, *Bioindicators, *Midges, *Trophic level, Invertebrates, Tubificids, Aquatic insects, Larvae, Lakes, Aquatic animals, Water pollution, Diptera, Annelids, Oligochaetes, Oligotrophy, Eutrophication, Larval growth stage.
Identifiers: Lake Malaren, Lake Vattern, Lake Vanern, *Sweden, Sensitivity, Chironomids, Microspectra spp, Heterotrissocladius subpilosus, Stictochironomus rosenscholdii, Sergentia coracina, Chironomus anthracinus, Chironomus plumosus, Procladius spp, Chaoborus flavicans, Macroinvertebrates.

During recent years, comprehensive chemical and biological investigations of the large lakes of Sweden have been conducted. The studies were initiated in 1964 as a consequence of the alarming deterioration of the water quality in Lake Malaren. The biological section of the Lake Malaren Research project, later renamed the Limnological Survey of the National Swedish Environment Protection Board (NLU), has undertaken studies of phytoplankton, primary production, zooplankton, bacteria, bottom fauna, macrophytes and fish. The composition of the bottom fauna has proved to give valuable information about the water quality. The use of certain midge larvae as indicator organisms is demonstrated with examples from the lakes mentioned above. It is concluded that comprehensive information on the trophic state and the degree of pollution in a water may be obtained through analysis of a few, ecologically significant species. (Holoman-Battelle)
W74-01531

DEGRADATIVE VERSATILITY OF CORYNEBACTERIUM PSEUDODIPHTHERITICUM NCIB 10803 WHICH USES AMIDES AS CARBON SOURCE,
Nottingham Univ. (England). Dept. of Pharmacy.
D. J. W. Grant.
Antonie van Leeuwenhoek, Vol 39, No 2, p 273-279, 1973. 1 tab, 12 ref.

Descriptors: *Microbial degradation, *Organic compounds, *Aerobic conditions, Metabolism, Amino acids, Carbohydrates, Biodegration, Ureas, Cellulose, Hexadecanol, Phenols, Aromatic compounds, Organic acids, Biological properties, Aerobic bacteria.
Identifiers: *Corynebacterium pseudodiphtheriticum, *Bacterial physiology, *Amides, *Carbon sources, Substrate utilization, Aromatic hydrocarbons, Organonitrogen compounds, Fate of pollutants, Biochemical characteristics, Nitriles, Fatty acids, Paraffins, alpha omega-Alkandioic acids, Benzenoid compounds, Nutrient sources, Aliphatic hydrocarbons, Culture media, Polysaccharides, Disaccharides, Monosaccharides, Heterotrophic bacteria, Catechol, Alanine, Arginine, Asparagine, Glutamates, Glutamine, Histidine, Leucine.

Corynebacterium pseudodiphtheriticum NCIB 10803 was tested for aerobic growth with a large number of C sources in mineral salts medium with NH4 (plus) as N source. Growth was supported by some amino acids, some sugars, compounds of the Krebs' cycle, the higher normal paraffins, normal aliphatic alchols, fatty acids, the amides and nitriles of fatty acids, alpha omega-alkandioic acids and some simple benzenoid compounds. Possible metabolic pathways are discussed. Degradation of catechol proceeded by ortho-fission via cis-cis-muconate. (Holoman-Battelle)
W74-01536

INHIBITION BY FATTY ACIDS OF THE BIODEGRADATION OF PETROLEUM,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Biochemistry and Microbiology.
R. M. Atlas, and R. Bartha.
Antonie van Leeuwenhoek, Vol 39, No 2, p 257-271, 1973. 9 fig, 3 tab, 13 ref.

Descriptors: *Microbial degradation, *Inhibition, Effects, Cultures, Pollutant identification, Dialysis, Biodegradation, Oil, Marine bacteria, Organic acids, Gas chromatography, Isolation, Metabolism, Organic compounds.
Identifiers: *Brevibacterium, *Flavobacterium, Mineralization, *Crude oil, Synergistic effects, *Fatty acids, Petroleum hydrocarbons, Substrate utilization, Metabolites, Caprylic acid, Lauric acid, Myristic acid, Palmitic acid, Stearic acid, Degradation products, Flame ionization gas chromatography, Gas liquid chromatography, Sweden crude oil, Oxygen consumption, Octanoic acid, Dodecanoic acid, Tetradecanoic acid, Hexadecanoic acid, Octadecanoic acid, n-Paraffins, Thin layer chromatography, Fate of pollutants.

The accumulation of toxic intermediary metabolites, possibly fatty acids, has been investigated as the probable cause for the cessation of the biodegradation of crude oil over a period of time. Dialysis cultures of Brevibacterium and Flavobacterium which contained Sweden crude oil were used in the study. The residual oil was extracted at the end of each experiment and its amount determined by gas chromatography. Artificial seawater media plus Sweden crude oil or a simplified model petroleum were inoculated with one of the bacteria and the cultures incubated for 8 days at 28 C on a rotary shaker at 200 rev/min. Extracts of the media were analyzed by thin-layer and flame ionization gas-liquid chromatography to determine the fatty acid metabolites. Biodegradation and mineralization of crude oil in the presence of fatty acids were measured. The extent of biodegradation of petroleum by the two marine bacterial isolates was found to increase when the organisms were grown in dialysis culture. This suggests that inhibitory products are formed during growth on petroleum. Fatty acids were produced by both organisms and were present in the dialyzate (dialyzable material). Fatty acids and crude oil were found to have a synergistic toxic effect. Short-chain acids were more toxic than longer-chain ones. (Holoman-Battelle)
W74-01537

INVESTIGATIONS ON THE SHEATHED BACTERIUM HALISCOMENOBACTER HYDROSSIS GEN.N., SP.N., ISOLATED FROM ACTIVATED SLUDGE,
Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology.
W. L. Van Veen, D. Van Der Kooij, E. C. W. A. Geuze, and A. W. Van Der Vlies.
Antonie van Leeuwenkoek, Vol 39, No 2, p 207-216, 1973. 8 fig, 16 ref.

Descriptors: *Activated sludge, *Isolation, *Pollutant identification, *Sewage bacteria, Cytological studies, Biological properties, Nutrient requirements, Methodology, Speciation, Cultures, Aquatic habitats, Systematics.
Identifiers: *Haliscomenobacter hydrossis, Culture media, Biochemical characteristcs, Bacterial physiology, Cell morphology, Sewage microorganisms, Selective media.

The morphological and physiological properties are described of a recently isolated, thin, sheathed bacterium. The observations demonstrate that this bacterium differs from the known sheathed microorganisms in many characteristics. The following nomenclature is therefore proposed: Haliscomenobacter hydrossis gen.n. sp.n. The growth of this bacterium in activated sludge is discussed. (Holoman-Battelle)
W74-01539

BACTERIOLOGY OF ACTIVATED SLUDGE, IN PARTICULAR THE FILAMENTOUS BACTERIA,
Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology.
W. L. Van Veen.
Antonie van Leeuwenhoek, Vol 39, No 2, p 189-205, 1973. 22 fig, 36 ref.

Descriptors: *Activated sludge, *Isolation, Pollutant identification, *Sewage bacteria, *Cytological studies, Aquatic bacteria, Microbiology, Electron microscopy, Cultures, Methodology, Aquatic microorganisms, Aerobic bacteria.
Identifiers: *Cell morphology, *Bacterial physiology, *Filamentous bacteria, Culture media, Sewage microorganisms, Sphaerotilus natans, Sphaerotilus discophorus, Streptothrix hyalina, Flavobacterium, Gram-negative bacteria, Phase contrast microscopy, Flexibacter, Microscilla, Gram-positive bacteria.

Microscopic examination of bulking activated sludge samples showed the presence of a variety of filamentous microorganisms, some of which have not yet been described in the literature. A method was developed to obtain pure cultures of these threaded bacteria. To date, five clearly different groups of filamentous bacteria may be distinguished by the determination of a few morphological and physiological characteristics of the isolates. A variety of sheathed bacteria are included in Group I. Group II includes non-motile, gram-negative, orange- or yellow-pigmented filamentous bacteria. These microorganisms are thought to be related to some species of the genus

Flavobacterium. The gram-negative, threaded bacteria of Group III show a more or less distinct gliding movement and form red colonies on rich agar media. These bacteria may apparently be related to species described in the genera Microscilla and Flexibacter. The filamentous bacteria of Group IV structually resembled some Cyanophyceae, but do not contain photosynthetic pigments. They are gram-positive and non-motile. A number of unknown, non-motile bacteria which stain gram-positive with a variable number of gram-negative autolyzed cells in the filaments, are assigned to Group V. The properties of the isolated bacteria are described briefly and their occurrence in bulking activated sludge is discussed. (Holoman-Battelle)
W74-01540

ISOTOPE FRACTIONATION OF N-15 AND N-14 IN MICROBIOLOGICAL NITROGEN TRANSFORMATIONS: A THEORETICAL MODEL,
California Univ., Riverside.
D. D. Focht.
Journal of Environmental Quality, Vol 2, No 2, p 247-252, April-June, 1973. 2 fig, 1 tab, 29 ref.

Descriptors: *Nitrogen, *Model studies, *Isotope fractionation, *Microbial degradation, Ammonification, Nitrification, Microorganisms, Metabolism, Kinetics, Nutrients, Chemical reactions, Regression analysis, Theoretical analysis, Nitrates.
Identifiers: *Biotransformation, N-14, N-15, Fate of pollutants, Data interpretation, Isotope discrimination, Isotope effect, Nitrogen radioisotopes, Enrichment, Substrate utilization.

The kinetics for first-order multisequence reactions are derived for microbial fractionation of N-14 and N-15 isotopes. The isotope effect accounts for unreacted substrate becoming progressively enriched in the heavier isotope due to preferential utilization of the lighter isotope by microorganisms. Consequently, during denitrification nitrate becomes enriched in N-15 as its concentration diminishes. This inverse proportional relationship is expressed as a hyperbolic function, y equals ax to the minus b power. Similar curves are derived for nitrate originating from ammonification and/or nitrification. Regression coefficients for a straight line approximation are better than 0.98, but not as good as the actual coefficients for the derived hyperbolic equations. A negative regression 'line' for nitrate occurs for all denitrification reactions during isotope discrimination. Nitrate originating from caesin, ammonium, and nitrate are respectively less enriched in N-15 or equal nitrate concentration due to ammonium and nitrate being initially enriched in N-14 during ammonification and nitrification, respectively. (Holoman-Battelle)
W74-01541

RHODOPSEUDOMONAS SULFIDOPHILA, NOV. SPEC., A NEW SPECIES OF THE PURPLE NONSULFUR BACTERIA,
Groningen Rijksuniversiteit (Netherlands). Dept. of Microbiology.
T. A. Hansen, and H. Veldkamp.
Archiv fur Mikrobiologie, Vol 92, No 1, p 45-58, July 10, 1973. 3 fig, 3 tab, 26 ref.

Descriptors: *Photosynthetic bacteria, *Pollutant identification, *Isolation, *Nutrient requirements, *Cytological studies, Pigments, Biological properties, Speciation, Intertidal areas, Mud flats, Anaerobic bacteria, Hydrogen sulfide, Organic compounds, Marine bacteria, Vitamins, Limiting factors, Electron microscopy, Systematics.
Identifiers: Biochemical characteristics, *Rhodopseudomonas sulfidophila, Substrate utilization, Bacterial physiology, Cell morphology, Culture media, Bacteriochlorophyll a, Absorption spectra, Rhodopseudomonas capsulata, Rhodopseudomonas palustris, Chromatium vinosum, Ectothiorhodospira.

From marine mud flats a new type of photosynthetic purple bacterium was isolated. This type is described as a new species of the Rhodospirillaceae and is named Rhodopseudomonas sulfidophila. The cells are rod-shaped, 0.6 to 0.9 micron wide and 0.9 to 2.0 microns long, and motile by means of polar flagella. Cell division occurs by binary fission. The photosynthetic membrane system is of the vesicular type. The pigments consist of bacteriochlorophyll a and of carotenoids, most probably of the speroidene group. A wide range of organic compounds can be utilized anaerobically in the light. Growth on organic compounds aerobically in the dark is also possible. Niacin, thiamin, biotin and p-aminobenzoic acid are required as growth factors. The new species needs 2.5 percent (w/v) sodium chloride for optimal growth. All strains show excellent photolithotrophic growth on hydrogen, hydrogen sulfide, and theiosulfate. They show a remarkably high sulfide tolerance. Sulfide and thiosulfate are oxidized to sulfate without an intermediate accumulation of elemental sulfur. The new species seems to be one of the most versatile types of photosynthetic bacteria isolated thus far. (Holoman-Battelle)
W74-01544

LITMUS MILK REACTION AS A DISTINGUISHING FEATURE BETWEEN STREPTOCOCCUS FAECALIS OF HUMAN AND NON-HUMAN ORIGINS,
Tennessee Univ., Knoxville. Dept. of Microbiology.
For primary bibliographic entry see Field 05A.
W74-01549

2,4-DICHLOROPHENOXYACETATE METABOLISM BY ARTHROBACTER SP.: ACCUMULATION OF A CHLOROBUTENOLIDE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
K. W. Sharpee, J. M. Duxbury, and M. Alexander.
Applied Microbiology, Vol 26, No 3, p 445-447, September 1973. 1 fig, 5 ref.

Descriptors: *2 4-D, *Metabolism, *Microbial degradation, *Assay, Enzymes, Herbicides, Chlorinated hydrocarbon pesticides, Cultures, Bacteria, Pollutant identification, Chromatography, Aerobic bacteria.
Identifiers: Fate of pollutants, *Arthrobacter, 2-Chloro-4-carboxymethylene but-2-enolide, Delactonizing enzymes, Sample preparation, Heterotrophic bacteria, Bioaccumulation, *Chlorobutenolides, Lactonizing enzymes, cis cis-2 4-Dichloromuconate, Degradation products, Metabolites.

A study was conducted to determine whether cis,cis-2,4-dichloromuconate is an intermediate in 2,4-D metabolism by Arthrobacter sp. Cultures of the microbe were grown at 25C in a 0.2 percent 2,4-D mineral salts medium. The cells were collected by centrifugation and washed three times in a cold buffer, suspended in the buffer containing glass beads and deoxyribonuclease, and disrupted with a sonic oscillator. The preparation was centrifuged at 55,000 g for 1 hr to yield the crude extract. The cis,cis-2,4-dichloromuconate-lactonizing enzyme was assayed by measuring the change in absorbance at 268 nm. This enzyme preparation coverted cis,cis-2,4-dichloromuconate to chloromaleylacetate. The enzyme lactonizing the dichloromuconate to yield 2-chloro-4-carboxymethylene but-2-enolide was separated from the butenolide-delactonizing enzyme. (Holoman-Battelle)
W74-01550

BIODEGRADATION OF O-BENZYL--P-CHLOROPHENOL,
Monsanto Co., St. Louis, Mo.
R. D. Swisher, and W. E. Gledhill.
Applied Microbiology, Vol 26, No 3, p 394-398, September 1973. 5 fig, 1 tab, 12 ref.

Descriptors: *Biodegradation, *Sewage, *Activated sludge, *Bactericides, Microbial degradation, Phenols, Water, Rivers, Colorimetry, Methodology, Phenolic pesticides, Pollutants, Linear alkylate sulfonates, Organic compounds.
Identifiers: Natural waters, *Stanophen 1, Carbon dioxide evolution, o-Benzyl-p-chlorophenol, Degradation products, Dissolved organic carbon, Trisodium citrate, Chemical interference.

The extent of biodegradation of o-benzyl-p-chlorophenol, marketed as a germicide under the name Santophen 1 (Monsanto Co.), in river water, sewage, and activated sludge was determined. Biodegradation was assessed by use of a clorimetric procedure for phenolic materials, carbon analysis, and CO2 evolution. In unacclimated river water, 0.1 mg of Santophen 1 per liter was degraded within 6 days. In sewage 0.5 and 1.0 mg/liter levels of Santophen 1 were degraded in 1 day. Acclimated activated sludge achieve 80 percent biodegradation of 1.0 mg/liter Santophen 1 in 8 h and 100 percent in 24 h. When effluent from a semicontinuous activated sludge unit, acclimated to 20 mg of Santophen 1 per liter was used as the inoculum for the CO2 evolution procedure, 60 percent of the total theoretical CO2 was evolved from Santophen 1. Based on the results, indicating santophen 1 to be readily biodegraded in at least four biological systems, the continued use of present levels of Santophen 1 should present no significant environmental problems. (Holoman-Battelle)
W74-01552

BIODEGRADATION OF PHENYLMERCURIC ACETATE BY MERCURY-RESISTANT BACTERIA,
Maryland Univ., College Park. Dept. of Microbiology.
J. D. Nelson, W. Blair, F. E. Brinckman, R. R. Colwell, and W. P. Iverson.
Applied Microbiology, Vol 26, No 3, p 321-326, September 1973. 3 fig, 1 tab, 19 ref.

Descriptors: *Microbial degradation, *Metabolism, Mercury, Isolation, Cultures, *Biodegradation, Heavy metals, Pseudomonas, Estuarine environment, Radioactivity techniques, Fungicides, Metal organic pesticides, Resistance, *Bacteria.
Identifiers: *Phenylmercuric acetate, Degradation products, Biotransformation, *Fate of pollutants, Mercury-resistant bacteria, Mercurials (Pesticides), Benzene, Selective media, Vibrio, Arthrobacter, Citrobacter, Enterobacter, Flavobacterium, Organometallics, Slimicides, Flameless atomic absorption spectrophotometry, Vapor phase chromatography, Metabolites.

The metabolism of phenylmercuric acetate (PMA) by selected strains of bacteria was investigated in order to gain an understanding of bacterial mercury resistance, as well as to assess the role of bacteria in transformations of mercury in the natural environment. Mercury-resistant bacteria were isolated from water and sediment on a solid selective medium containing PMA and HgC12. Out of nearly 900 cultures, a group of nine representative cultures was selected and screened for the degradative ability using radioisotope and bioreactor experiments. By means of a closed system incorporating a flameless atomic absorption spectrophotometer and a vapor phase chromatograph, it was demonstrated that elemental mercury vapor and benzene were products of phenylmercuric acetate degradation. (Holoman-Battelle)
W74-01555

PREDICTION OF THE VARIATION IN THE CHEMISTRY OF A LAKE RESULTING FROM AN INCREASE IN SOLUBLE DEPOSITS: APPLICATION: THE SODIUM IN LAKE NEUCHATEL,
Neuchatel Univ. (Switzerland). Centrahydrogeologie.
For primary bibliographic entry see Field 02H.
W74-01562

OCCURRENCE AND CUMULATION OF MICROCOMPONENTS IN BOTTOM SEDIMENTS OF DAM RESERVOIRS OF SOUTHERN POLAND,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
K. Pasternak, and J. Glinski.
Acta Hydrobiol, Vol 14, No 3, p 225-255, 1972, Illus.
Identifiers: *Bottom sediments, Cumulation, Dams, Micro components, *Poland, Pollution, Reservoirs, *Sediments.

The total amount of microcomponents in sediments depends above all on their grain composition. An exception here are sediments of reservoirs supplied with strongly polluted water. The quantitative differentiation of microcomponents within each granulometric group of sediments, as well as between single samples from various zones of the reservoirs, shows a tendency to a relationship with the quantity and quality of clayey and organic matter in the sediment. The presence in the substratum of the catchment basin of the reservoirs of rock layers containing Zn and Pb minerals, or dust coming from the Zn and Pb industries, has some influence on the increase in the amount of these components in the sediments. The main sources of microcomponents in the sediments of pure reservoirs are suspensions brought in by the water of the river, and remains of organisms developing in the reservoirs. The degree of cumulation of microcomponents in the sediments of dam reservoirs is much higher than in land soils and the soils of fish-ponds. Vm accumulates in the sediments in particularly large amounts. The degree of concentration of some microcomponents in the sediments of polluted reservoirs corresponds in general to the quantity and quality of pollution.--Copyright 1973, Biological Abstracts, Inc.
W74-01565

SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF ANP-2 COMPOUND IN WATER BODIES, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 05G.
W74-01581

THERMAL STRATIFICATION IN INDUSTRIAL CANALS,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 02E.
W74-01594

A CHEMICAL SURVEY OF THE MALACCA RIVER,
Kempas Devon Estate, Malacca (Malaysia).
For primary bibliographic entry see Field 02K.
W74-01600

A MATHEMATICAL MODEL OF PRIMARY PRODUCTIVITY AND LIMNOLOGICAL PATTERNS IN LAKE MEAD,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 05C.
W74-01630

RELATIONSHIPS OF INDICATOR AND PATHOGENIC BACTERIA IN STREAM WATERS,
Detroit Univ., Mich.
R. J. Smith, R. M. Twedt, and L. K. Flanigan.
Journal Water Pollution Control Federation, Vol 45, No 8, p 1736-1745, August 1973. 7 fig, 5 tab, 14 ref.

Descriptors: *Pathogenic bacteria, *Cultures, *Bioindicators, *Salmonella, Density, Water pollution effects, Coliforms, Streptococcus, Separation techniques, Seasonal, E. coli, Pollutant identification, Viability.
Identifiers: *Fecal coliforms, *Fecal streptococci, *Survival, Culture media, Enrichment, Saline River, Huron River, MPN, Membrane filter, Validity.

The Saline and Huron Rivers (Michigan) were bacteriologically examined from August 1969 through July 1970 to determine whether a stable relationship exists between indicator organisms and Salmonella organisms. The analysis determined density relationships of Salmonella, coliform, and streptococcus organisms and survival of Salmonella in natural environments. Coliforms and fecal streptococci were determined by membrane filter techniques. Salmonellae were determined by MPN techniques using dulcitol selenite enrichment and XLD agar. Survival studies were conducted by suspending cellulose dialysis tubing containing organisms in one of the rivers for four days. Viability was determined daily. Salmonellae were isolated when the fecal coliform concentration was as low as 52/100 ml in the Saline River and 4/100 ml in the Huron. The fecal coliform concentration was greater than 200/100 ml in two-thirds of the samples from the Saline and in one-third of the samples from the Huron that were positive for salmonellae. Samples from both rivers exhibited seasonal trends in the distribution of feal coliform to fecal streptococcus concentrations. The relationship of Salmonella survival resembled that of fecal coliforms. (Little-Battelle)
W74-01645

THE ROLE OF MICRO-ORGANISMS IN WASTE TIP-LAGOON SYSTEMS PURIFYING COKE-OVEN EFFLUENTS,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Microbiology.
For primary bibliographic entry see Field 05D.
W74-01647

5C. Effects of Pollution

BIOCHEMISTRY OF ESTUARINE ECOSYSTEM WITH EMPHASIS ON HEAVY METALS AND SHELLFISH,
Maryland Univ., College Park. Dept. of Chemistry.
M. Keeney.
Available from the National Technical Information Service as PB-225 121/3, $2.75 in paper copy, $1.45 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No. 15, March 1973. 7 p, 8 ref. OWRR B-012-MD (1).

Descriptors: Heavy metals, Shellfish, *Oysters, *Sea nettles, *Copper, Water pollution effects, Biochemistry, *Chesapeake Bay, Estuarine environment, Ecosystems, *Enzymes.
Identifiers: Glutathione, Proline.

The main purpose was to obtain basic information on the biochemistry of estuarine animals in order to understand the mechanism and effects of heavy metal uptake on these animals. An M.S. thesis has been completed on factors influencing the uptake of copper by oysters under controlled laboratory environments. An abstract of the thesis (The Accumulation of Copper by the American Oyster (Crassostrea virginica) Gmelin, by J. W. Warner, 1972) is included as part of this report. A paper on the effect of glutathione, proline, and shrimp extract on the gastric fluid of the Chesapeake sea nettle has been accepted for publication in Chesapeake Science. A copy of this manuscript (Some Observations on the Effect of Glutathione Proline, and Shrimp Extract on the Gastric Fluid of the Chesapeake Bay Sea Nettle, Chrysaora quinquecirrha (Desor), by B. C. Stewart, S. Lakshmanan, and H. J. Linder (1973)) is included in this report. A Ph.D. thesis is in preparation on the properties of the enzymes of gluconeogenesis in oysters. The results of this part of the work will be reported under the extension of this project.
W74-01108

THE DISTRIBUTION, COMPOSITION AND BIOMASS OF THE CRUSTACEAN ZOOPLANKTON POPULATION IN WESTERN LAKE SUPERIOR,
Wright State Univ., Dayton, Ohio. Dept. of Biological Sciences.
J. B. Conway, O. R. Ruschmeyer, T. A. Olson, and T. O. Odlaug.
Available from the National Technical Information Service as PB-225 137/9, $4.75 in paper copy, $1.45 in microfiche. University of Minnesota, Minneapolis. Water Resources Research Center, Bulletin 63, August 1973. 157 p, 44 fig, 26 tab, 54 ref. OWRR A-022-MINN (3).

Descriptors: Zooplankton, *Lake Superior, *Productivity, *Biomass, *Crustaceans, Cladocerans, Copepods, Phytoplankton, Lakes, Water pollution effects.
Identifiers: *Alona guttata Sars, *Holopedium gibberum Zaddach, *Zooplankton patchiness.

Although data were collected for two years, 1970 and 1971, the major portion of this research was carried out the second year. This research took place in western Lake Superior and most of the data were collected at two stations, Larsmont and Stony Point, which were twenty miles northeast of Duluth. The major purposes were to study the productivity and the vertical, seasonal and horizontal distribution of the crustacean zooplankton population in western Lake Superior. A limited study of the biology of the copepod, Limnocalanus macrurus, was also conducted. Productivity differences were found between the various sites and stations. These differences point to the lack of homogeneity in the horizontal distribution of the crustacean zooplankton population and support the phenomenon of 'zooplankton patchiness'. Productivity levels at the Little Marais and Sugar Loaf Cove area were from one-third to two-thirds of those at Larsmont and Stony Point. The Larsmont station was slightly more productive than Stony Point. The Stony Point inshore site was slightly more productive than the offshore site. The period of maximum productivity occurred at the Larsmont inshore site and at both Stony Point sites in September. Maximum productivity was recorded at the Larsmont offshore site in July. (Walton-Minnesota)
W74-01109

NUTRIENT SOURCES AND TRANSPORT IN THE UPPER AND CENTRAL REGIONS OF THE BIG SIOUX RIVER,
South Dakota Cooperative Fishery Unit, Brookings.
For primary bibliographic entry see Field 05B.
W74-01115

EFFECTS OF PROTOZOA ON THE FATE OF PARTICULATE CARBON,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
H. W. Holm, and F. A. Smith.
Copy available from GPO Sup Doc as EP1.23:660-73-007, $0.70; microfiche from NTIS as PB-225 143/7, $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-007, August 1973. 36 p, 10 fig, 8 tab, 24 ref. EPA Project 16050 GJC.

Descriptors: *Protozoa, *Aquatic microbiology, *Aquatic bacteria, *Carbon cycle, *Cycling nutrients, Carbon dioxide, Aquatic microorganisms, Food chain, Secondary productivity, Growth rates, Predation.
Identifiers: *Carbon transformation, Carbon utilization, Population dynamics, Organic carbon, Citrobacter, Tetrahymena pyriformis.

Laboratory studies were designed to define the role of protozoa in the fate of particulate (bacteria) organic carbon. Specific objectives were (1) to measure the effects of selected environmental parameters on protozoan growth rates, (2) to mea-

sure organic carbon in bacteria and protozoa, and (3) to quantitate carbon transformations in predator-prey experimental systems. A growth system containing 2 x 10 to the 8th power Citrobacter/ml in 1 x 0.001 M phosphate of pH 7.5, incubated at 25 deg C at a shaking rate of 100 rpm, was found to be an optimal environment for protozoan growth. The nutrient bacterium, Citrobacter, contained 8.6 x 10 to the minus 11th power mg C/cell, and Tetrahymena pyriformis contained 1.1 x 0.000001 mg C/cell. T. pyriformis altered the amount and form of carbon in the system while growing on bacteria. Of the total organic carbon present at the initiation of the predator-prey experiment (93 mg), 93% was in the bacterial fraction. Within 96 hours, 38% of the carbon was released as CO2; 5% was present as inorganic carbon in the water and the remainder (57%) was present as organic carbon. The organic carbon in the bacterial fraction decreased from 86 to 2 mg within 96 hours, while the carbon in the protozoan biomass increased from 1 to 40 mg. In the bacterial control, 11% of the organic carbon was released as CO2 within 96 hours while negligible amounts of inorganic carbon remained in the water. (EPA)
W74-01117

MATHEMATICAL MODELING OF NUTRIENT - TRANSPORT,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 05B.
W74-01121

BATRACHOSPERMUM VAGUM AG. IN THE SZCZECIN POMERANIA, A LOCALITY NEW TO POLAND, (IN POLISH),
Wyzsza Szkola Rolnicza, Szczecin (Poland). Katedra Botaniki.
For primary bibliographic entry see Field 02H.
W74-01219

INVESTIGATIONS ON THE CHANGES IN THE CONTENT OF HEAVY METALS IN LAKE WATERS OF THE MASURIAN LAKE DISTRICT,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowa (Poland). Instytut Hydrobiologii Ochrany Wodnego.
For primary bibliographic entry see Field 05B.
W74-01221

ADSORPTION OF COLLOIDAL IRON BY BACTERIA,
Queensland Univ., Brisbane (Australia). Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01253

ZOOBENTHOS OF THE AZOV SEA AFTER THE CONTROL OF THE DON RIVER, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
For primary bibliographic entry see Field 02L.
W74-01257

A DISEASED TROUT: MICROBIOLOGICAL STUDY OF ITS PRINCIPAL ORGANS AND ITS ENVIRONMENT,
Lyon Univ. (France). Unite d'Enseignement et de Recherche Sciences Pharm.
R. Moreau, and J. Brisou.
Bull Mens Soc Linn Lyon, Vol 40, No 8, p 237-243, 1971.
Identifiers: Aeromonas-liquefaciens, *Bacteria, Citrobacter-freundii, Diseased fish, Empedobacter, Environment, Erwinia-cacticida, Erwinia-ichthyosmia, Escherichia-freundii, *France (Haute-Savoie), Innominatus, Microbiological studies, Organs, Phytobacterium, Phytobacterium-fabae, Phytobacterium-liquefaciens, Pseudomonas-fabae, *Trout (Diseased).

An etiological investigation of an infectious epizootic among rainbow trout at a hatchery in the Haute-Savoie department of France was conducted. There was considerable pollution of the culturing pools, attributable to a lack of maintenance. An infected trout (gyrating motion was symptomatic) was septicemic: Erwinia ichthyosmia was isolated from the blood and heart, E. cacticida from the liver, and Phytobacterium (± Aeromonas) liquefaciens from the gills, blood, heart and intestine. P. (Pseudomonas) fabae was present in all organs examined and Citrobacter (Escherichia) freundii was also present in the blood. The 2 bacteria found in most organs examined (P. fabae and P. liquefaciens) were not found in the pools. P. liquefaciens is especially pathogenic for fish and was probably introduced into the pools by young fish. The taxonomic validity of the genera Phytobacterium, Empedobacter, and Innominatus was defended. A number of bacteria were isolated in biotopes different from those normally reported for them.--Copyright 1973, Biological Abstracts, Inc.
W74-01267

THE BOTTOM MACROFAUNA OF THE OLIGOTROPHIC LAKE KONNEVESI, FINLAND,
Jyvaskyla Univ. (Finland). Dept. of Biology.
J. Sarkka.
Ann Zool Fenn. Vol 9, No 3, p 141-146. 1972. Illus.
Identifiers: Biomass, *Bottom fauna, *Chironomids, Fauna, *Finland (Lake Konnevesi), Gammaracanthus-Lacustris, Lakes, Mysis-Relicta, *Oligotrophic lakes, Pallasea-Quadrispinosa, Pisidium-Conventus, Pontoporeia-Affinis.

The abundance of the bottom fauna of this lake is lowest around the thermocline and in the greatest depths (>35m). The dominant species of the profundal zone is Pisidium conventus, and larvae of Chironomids dominate in the sublittoral. The abundances of the dominant species, the toal numbers of individuals and the biomasses were practically the same in the different parts of the lake. The glacial relects Gammaracanthus lacustris, Pallasea quadrispinosa, Pontoporeia affinis, and Mysis relicta are new records for lake Konnevesi. Diversity indices were calculated to compare the different sub-areas. The values of these indices and the factors affecting them are discussed. It is suggested that the low abundances observed for the greatest depths are chiefly due to the low O2 content in winter. It is difficult to classify this lake on the basis of its bottom fauna into any one of the conventional limnological lake types.--Copyright 1973, Biological Abstracts, Inc.
W74-01287

EFFECTS OF PARAQUAT ON INVERTEBRATES IN A CANTEBURY STREAM, NEW ZEALAND,
Ministry of Agriculture and Fisheries, Wellington (New Zealand). Fisheries Research Div.
A. M. R. Burnet.
New Zealand Journal of Marine and Freshwater Research, Vol 6, No 4, p 448-455, December 1972. 3 fig, 3 tab, 5 ref.

Descriptors: *Herbicdies, *Invertebrates, *Aquatic animals, *Water pollution effects, Aquatic insects, Mollusks, Crustaceans, Pesticides, Halogenated pesticides, Water sampling, Caddisflies, Amphipoda, Mayflies, Water beetles, Diptera.
Identifiers: *Paraquat, Macroinvertebrates, *New Zealand (Waimakariri River), Ostracods, Bugs, Seed shrimp, Scuds.

During 1966 and 1967, paraquat was applied on three occasions at 2 ppm for 30 min to control aquatic weeds in the South Branch experimental stream, a tributary of the lower Waimakariri River, Canterbury, South Island, New Zealand. Effects on the invertebrate fauna of the stream were studied before, during, and after the applications, by Surber and drift-net samples. After a heavy initial kill, the paraquat treatment reduced the number of amphipods caught in the drift fauna to 5 percent of the pre-treatment level, and there was a slight reduction in the numbers of hemipterans. The total numbers in Surber samples increased markedly a year after treatments ended, mainly due to increased numbers of trichopterans. (Holoman-Battelle)
W74-01298

LOSS OF PHOTOSYNTHETIC ACTIVITY IN TWO BLUE-GREEN ALGAE AS A RESULT OF OSMOTIC STRESS,
York Univ., Downsview (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-01302

PROTOZOA FROM BLUE LAKE, RAOUL ISLAND,
Massey Univ., Palmerston North (New Zealand). Dept. of Microbiology and Genetics.
T. J. Brown, and J. A. Peart.
New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos 1/2, p 171-178, June 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Hydrogen ion concentration, *Protozoa, *Water quality, Mud, Benthos, Sampling, Population, Adaptation.
Identifiers: Amoeba, Acanthamoeba, Aulacantha, Paramecium, Vorticella, Euplotes, Oncychodromus, Oxytricha, *New Zealand (Blue Lake), Species diversity.

Protozoa were collected in universal bottles from four microhabitats of Blue Lake: (1) within the bottom mud, (2) on the surface of the mud, (3) from midwater, and (4) from the water surface. The pH of each sample was determined at the time of collection and regularly throughout the observation period in the laboratory. Upon arrival at the laboratory, samples were transferred to petri dishes and maintained for observation without the addition of enrichment media. Protozoan populations were measured with a modified Fuchs-Rosenthal haemocytometer, and classification and identification were carried out by staining and observation by light microscropy and by phase contrast microscopy. The in situ pH values of the four microhabitats ranged from 6.8 to 9.0. After 2 days in vitro, the mud zones showed a marked drop in pH. The protozoan population contained few species, all showing a well developed ability to endure a wide pH range and/or related phenomena such as redox potential. The genera represented were Amoeba, Acanthamoeba, Aulacantha, Paramecium, Vorticella, Euplotes, Oncychodromus, and Oxytricha. (Little-Battelle)
W74-01310

FIELD AND EXPERIMENTAL STUDIES ON THE EFFECTS OF A POWER STATION EFFLUENT ON TUBIFICIDAE (OLIGOCHAETA, ANNELIDA),
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
R. J. Aston.
Hydrobiologia, Vol 42, Nos 2/3, p 225-242, August 15, 1973. 10 fig, 4 tab, 16 ref.

Descriptors: *Tubificids, *Powerplants, *Heated water, *Water pollution effects, Effluents, Annelids, On-site investigations, Laboratory tests, Water temperature, Dissolved oxygen, Animal physiology, Upstream, Downstream, Oligochaetes, Invertebrates, Bottom sampling, Reproduction, Cooling water, Animal populations, Mortality, Aquatic animals, *Thermal pollution.
Identifiers: Population density, Limnodrilus hoffmeisteri, Limnodrilus profundicola, Tubifex tubifex, Limnodrilus udekemianus, *United Kingdom (River Trent).

In order to study the effects of power plant effluents on tubificids, mud cores containing tubificids were collected downstream from three power plants which discharge warm condenser water into the River Trent. The worms were removed from the formalin-preserved cores and counted. Laboratory experiments were conducted to determine the effects of temperature on the reproductive rate of Limnodrilus hoffmeisteri and Tubifex tubifex and the combined effects of dissolved oxygen concentration and temperature on the reproductive rate of L. hoffmeisteri. Higher numbers of sexually mature worms of L. hoffmeisteri were found in the River Trent downstrem from Dradelow Power Stations than upstream. In the laboratory experiments it was found that: L. hoffmeisteri increased its rate of egg production with increase in temperature up to about 25 C while T. tubifex maintained a fairly steady rate of egg and cocoon production over a wide range of oxygen concentrations above 2 ppm. It seems likely that the difference between the numbers of sexually mature L. hoffmeisteri upstream and downstream from the power station were influenced more by the increased temperature, than in increased oxygen levels of the power station effluent, though under extreme conditions of deoxygenation, aeration of the river by the cooling towers at the power stations could increase the abundance of this species. (Holoman-Battelle)
W74-01312

THE ECOLOGY OF THE DIATOMS OF THE KLIP RIVER, SOUTHERN TRANSVAAL,
University of the Witwatersrand, Johannesburg (South Africa). Dept. of Botany.
F. D. Hancock.
Hydrobiologia, Vol 42, Nos 2/3, p 243-284, August 15, 1973. 5 fig, 2 tab, 33 ref, 2 append.

Descriptors: *Diatoms, *Ecology, *Aquatic algae, *Biological communities, Water properties, Water quality, Bioindicators, Chrysophyta, Physical properties, Chemical properties, Hydrogen ion concentration, Nitrogen, Dissolved oxygen, Alkalinity, Water pollution, Water sampling, Calcium, Industrial wastes, Conductivity, Sulfates, Dissolved solids, Magnesium, Turbidity, Ammonia, Nitrates, Bicarbonates, Iron, Chlorides, Statistical methods.
Identifiers: *South Africa (Klip River), Sample preparation, Sample preservation, Data interpretation, Frustulia rhomboides, Neidium affine, Fragilaria construens, Synedra tabulata, Surirella angusta, Melosira distans, Navicula ammophila, Nitzschia filiformis, Nitzschia kuetzingiana, Nitzschia laevidensis, Navicula thomasii, Achnanthes lanceolata.

Diatom associations formed by 2 percent or more of species, found by the Thomasson analysis method, are discussed in relation to the physical and chemical vicissitudes of a stream in which the head waters become cut off from those of the middle reaches by a barren zone caused by mineral and acid pollution from dumps resulting from the gold-mining industry on the Witwaterstrand. Associations are found indicative of the originating waters, of regions of instability due to the pollution, whether it be its onset or recovery therefrom and of the lower recovered middle reaches. In each reach there are found to be associations indicative of pH, nitrogen content, dissolved oxygen and alkalinity. Thus the associations enable one to 'read' the conditions of the river. An additional association occurs at the very turbid mouth of the river which is indicative of low light requirement. The work supports the findings of Cholnoky (1958 et seq.) in his researches into the diatom ecology of South African streams. (Holoman-Battelle)
W74-01313

NUTRIENT REMOVAL USING LEMNA MINOR,
Florida Dept. of Pollution Control, Tallahassee.
R. M. Harvey, and J. L. Fox.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1928-1938, September 1973. 9 fig, 6 tab, 25 ref.

Descriptors: *Bioassay, *Nutrients, *Digestion, *Nutrient removal, Nitrates, Nitrites, Phosphates, Potassium, Copper, Magnesium, Calcium, Zinc, Manganese, Iron, Sodium, Aluminum, Colorimetry, Nitrogen, Chlorophyll, Growth rates, Water analysis, Waste water (Pollution), Water treatment, Phosphorus, Flame photometry, Forages.
Identifiers: Bioaccumulation, *Lemna minor, *Cattle feed, Forageability, Biological samples, Wolffia columbiana, Salvinia rotundifolia, Removal, Emission spectroscopy, Sample preparation, Atomic absorption spectrophotometry, Chlorophyll a.

Lemna minor, Wolffia columbiana, and Salvinia rotundifolia, which have potential value for removing nutrients from wastewater, were studied with respect to four characteristics: (1) rapid growth, (2) large nutrient uptake potential, (3) ease of handling, and (4) potential economic resource (use as cattle feed). Preliminary studies showed Lemna to be the most promising of the three; therefore, it was chosen for further study. Plants were grown in 8-1 aquaria containing filtered undiluted secondary wastewater recirculated from a carboy. Control and test run effluent samples were taken at 0, 2, 4, 6, 8, and 10 days to measure percent removal of Kjeldahl nitrogen, nitrate nitrogen, nitrite nitrogen, and all forms of phosphorus. Plant tissues were analyzed for N, P, K, Cu, Zn, Mn, Fe, Na, and Al by emission spectrography, colorimetry, flame photometry, and atomic absorption. Chlorophyll a and growth rates were also measured. Forageability was determined by in vitro organic matter digestion involving 48-hr fermentation followed by HCl pepsin digestion and determination of residual organic matter. Total Kjeldahl nitrogen and total phosphorus were found to decrease 86.5 and 67 percent, respectively, over a 10-day period. Lemna was found to be more digestible by cattle than common pasture grass. These characteristics, combined with a rapid growth rate, could make duckweed desirable for use in tertiary treatment of wastewater. (Little-Battelle)
W74-01321

THERMOPHILIC OSTRACOD: AQUATIC METAZOAN WITH THE HIGHEST KNOWN TEMPERATURE TOLERANCE,
Oregon Univ., Eugene. Dept. of Biology.
C. E. Wickstrom, and R. W. Castenholz.
Science, Vol 181, No 4104, p 1063-1064, September 1973. 1 fig, 1 tab, 12 ref.

Descriptors: *Water temperature, *Bioassay, Resistance, *Thermal pollution, Water pollution effects, Lethal limit, *Heat resistance.
Identifiers: *Potamocypris, *Lethal temperature, Invertebrates, Survival, Lethal dosage, Seed shrimp.

Ostracods of the genus Potamocypris were collected from a thermal spring in Oregon and incubated from 1 minute up to 12 hrs. at temperatures ranging from 40 to 55.75 C to determine their thermal resistance. After exposure to elevated temperatures, the test tubes containing the organisms were immediately cooled to 40-45 C and observed for harmful effects. The upper lethal temperature ranged from 49 C for incubation of more than 5 hours to 55.75 C for 1-minute incubations. Calculated temperatures for 50 percent mortality for 60, 40, 20, 10, 5, and 1 minute of exposure were 50.44, 50.96, 51.43, 52.03, 52.77, and 55.12 C, respectively. This ostracod may have the highest temperature tolerance of any aquatic metazoan. (Little-Battelle)
W74-01327

N-NITROSATION BY NITRITE ION IN NEUTRAL AND BASIC MEDIUM,
National Cancer Inst., Bethesda, Md. Div. of Cancer Cause and Prevention.
For primary bibliographic entry see Field 05B.
W74-01328

ZOOPLANKTON IN KOLYMA-INDIGIRKA LAKES (IN RUSSIAN),
For primary bibliographic entry see Field 02H.
W74-01341

STUDIES OF RAPID NTA-UTILIZING BACTERIAL MUTANT,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05B.
W74-01348

TEMPERATURE SELECTION BY JUVENILE AND ADULT YELLOW PERCH (PERCA FLAVESCENS) ACCLIMATED TO 24 C,
Waterloo Lutheran Univ. (Ontario).
For primary bibliographic entry see Field 05A.
W74-01353

EMERGENCE, REPRODUCTION, AND GROWTH OF SETIPALPIAN PLECOPTERA IN SOUTHERN ONTARIO,
Waterloo Univ. (Ontario).
For primary bibliographic entry see Field 05A.
W74-01359

ROLE OF SILT IN MICROCYSTIS AERUGINOSA DEVELOPMENT, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
M. I. Kuz'menko.
Gidrobiol Zh. Vol 8, No 1, p 38-43, 1972. Illus. (English summary).
Identifiers: *Amino acids, *Fertilization, *Microcystis-Aeruginosa, Reservoirs, *Silt, Cyanphyta.

The water layer contiguous to silt is considered as a dynamic system through which absorption of bio- and organogens by silts takes place. Mixing of the 2 phase system of silt-water favors water fertilization with amino acids and other compounds, which has a positive effect on M. aeruginosa development. It is shown that when introducing silt (50 g/l of mineral medium) the number of cells of the alga increases as much as 1.5 times. Expansion of silted areas in reservoirs will promote the fertilization of tropic base for blue-green algae, in particular, the main agent of "bloom", M. aeruginosa. Copyright (c) 1973, Biological Abstracts, Inc.
W74-01368

EPIDEMIOLOGICAL AND TOXICOLOGICAL ASPECTS OF NITRATES AND NITRITES IN THE ENVIRONMENT,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
H. I. Shuval, and G. P. Kalinin.
Am J Public Health. Vol 62, No 8, p 1045-1052. 1972, Illus.
Identifiers: Diseases, Electroencephalogram, Environment, Epidemiological studies, Foods, Heart, Infants, Lung, Milk, *Nitrates, *Nitrites, Placental, Rat, Tomato, *Toxicological studies, Vitamin C, Potable water, *Methemoglobin.

Infants (2473) in areas with medium-high (50-90 mg/l as NO3) and low nitrate (5 mg/l as NO3) concentrations in drinking water were studied in an effort to determine whether there is any association between methemoglobin (MetHb) levels and nitrates in drinking water. No differences were found between the mean MetHb level in the study and control areas. A possible explanation that only

6% of the infants consumed appreciable amounts of tap water together with powdered milk formula. The remainder were breast-fed or consumed whole cow's milk. Of the infants, 87% were fed vitamin C rich foods which are known for their anti-MetHb effects. MetHb levels are highest in the first 60 days of life with a mean of 1.33%. The mean MetHb level for the entire infant population studied was 1.04 plus or minus .72%. Rats chronically exposed to 2000 and 3000 mg/l NaNO2 (250-350 mg/kg) in drinking water for two years showed distinct pathology in the heart and lung tissues as compared to controls. Pregnent rats given acute doses of NaNO2 varying from 2.5-50 mg/kg show transplacental passage of the chemical with the production of MetHb in the fetuses. Mice chronically exposed to 1000-2000 mg/l NaNO2 in their water showed lowered motor activity as compared to controls. Rats with electrodes implanted on the cortex were chronically exposed to nitrites in their drinking water in concentrations ranging from 100-2000 mg/l of NaNO2. All experimental groups showed major brain electrical activity changes as shown by EEG recordings after 2 wk as compared to their own controls and the control group. On cessation of exposed to nitrites after 2 mo., brain electrical activity changes in EEG recordings remained, suggesting some form of irreversible damage. The findings are being rechecked; if found to be correct, standards for allowable concentrations of nitrate and nitrite in food and water should be re-examined.--Copyright 1973, Biological Abstracts, Inc.
W74-01386

COPPER MICRONUTRIENT REQUIREMENT FOR ALGAE,
Missouri Univ., Columbia. Dept. of Chemistry.
S. E. Manahan, and M. J. Smith.
Environmental Science and Technology, Vol 7, No 9, p 829-833, September 1973. 6 fig, 2 tab, 10 ref.

Descriptors: *Bioassay, *Copper, Growth rates, *Nutrient requirements, *Chelation, Heavy metals, Limiting factors, Nutrients, Methodology, Essential nutrients, Water pollution effects, Plant growth.
Identifiers: *Chlorella vulgaris, *Oocystis marssonii, Culture media, Sample preparation, Ion selective electrodes.

Copper micronutrient requirements of Chlorella vulgaris and Oocystis marssonii were determined by measuring growth rates versus copper concentration in a culture mediumcontaining EDTA as a strong chelating agent. Since reagents used to prepare the medium contained variable amounts of Cu, electrolytic and extraction procedures were developed to purify them. The Cu concentration was monitored during purification and during growth tests with a cupric ion electrode. Growth tests were carried out in cleaned 500-ml polyethylene wash bottles to avoid erratic results which occur with glass containers. Solutions of CuSO4 in H2SO4 were diluted to prepare the Cu additions. A CO2-air mixture was bubbled through the cultures as a source of carbon and for pH control. Algal growth rates were determined by absorbance at 560 nm, and dry cell weight was measured by filtering and weighing the cells. The results show that the growth of the two algae is dependent upon the concentration of the free copper ion. Optimal growth occurred above 40 micrograms/l for Oocystis and above 30 micrograms/l for Chlorella. It appears that the presence of natural and pollutant chelating agents in water stimulate algal growth by creating a reservoir of trace metal species. (Little-Battelle)
W74-01398

LIGAND PHOTOOXIDATION IN COPPER (II) COMPLEXES OF NITRILOTRIACETIC ACID. IMPLICATIONS FOR NATURAL WATERS,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 05B.
W74-01400

PATHWAYS OF TRACE ELEMENTS IN ARCTIC LAKE ECOSYSTEMS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W74-01401

EVALUATION OF THE RESPONSE OF DUGESIA TIGRINA TO AFLATOXIN B1,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
G. C. Llewellyn.
Journal of the Association of Official Analytical Chemists, Vol 56, No 5, p 1119-1122, September 1973. 1 fig, 22 ref.

Descriptors: *Bioassay, *Toxicity, *Bioindicators, Animal growth, Laboratory tests, Laboratory animals, Invertebrates, Water pollution effects, Evaluation, Toxins, Mortality, Animal pathology, Lethal limit, Aquatic animals.
Identifiers: *Dugesia tigrina, *Alflatoxin B1, *Planarians, Regeneration, Sensitivity, Flatworms, Phytotoxins, Mycotoxins.

Groups of brown planaria, Dugesia tigrina, were exposed to varying concentrations of aflatoxin B1. Whole animals maintained in 3.125 micrograms/ml of toxic solution showed 50 percent lethality in 2 days; 1.562 micrograms/ml required 4 days; 0.781 microgram/ml required 7 days; and 0.312 microgram/ml required 15 days. Even greater lethal responses occurred when cut portions of planaria were exposed to the toxin, with the head sections in all concentrations showing higher levels of lethality than the tail sections. Regeneration of excised heads and tails was inhibited in 3.125 micrograms/ml medium; minimal regeneration occurred in 1.562 and 0.781 microgram/ml environments. D. tigrina, exposed to concentration levels of 0.312 and 0.156 microgram/ml of aflatoxin B1 in spring water, regenerated head and tail portions in a normal manner. No gross pathological abnormalities were observed in any regenerated tissue. The lethal response to low concentrations of the toxin suggests that the head portion of D. tigrina is one of the more sensitive organisms to aflatoxin B1. (Holoman-Battelle)
W74-01404

DIELDRIN. EFFECTS OF CHRONIC SUBLETHAL EXPOSURE ON ADAPTATION TO THERMAL STRESS IN FRESHWATER FISH,
Academy of Natural Sciences of Philadelphia, Avondale, Pa. Stroud Water Research Center.
E. K. Silbergeld.
Environmental Science and Technology, Vol 7, No 9, p 846-849, September 1973. 2 fig, 3 tab, 31 ref.

Descriptors: *Darters, *Bioassay, *Thermal pollution, *Dieldrin, Fish physiology, *Animal metabolism, Toxicity, Water temperature, Growth rates, Water pollution effects, Mortality.
Identifiers: *Pretreatment, Chronic tests.

The freshwater fish, Etheostoma nigrum, were pretreated with 2.3 ppb dieldrin for 30 days and then exposed to thermal stress by heating the water at a rate of 1 C/hr to a maximum of 7-9C above ambient temperature. These conditions simulate natural conditions which can occur in the U. S. Results were assessed by exposing other groups of fish to dieldrin alone or to thermal stress alone. Several indicators of metabolism and condition were measured during pretreatment, during thermal stress, and at the end of the tests: growth rate, feeding rate, whole blood glucose levels, oxygen consumption, rate of opercular movement, whole body lipid content, condition of liver, and liver histology. Pretreated fish demonstrated significant changes in all of the above parameters except opercular movement during the first 15 days of exposure to dieldrin. After 15 days, pretreated fish were found to have adapted to dieldrin exposure, as indicated by significant reversals of the above changes (except for liver damage, which was not reversed but progressed over time). In the adapted state, the pretreated fish remained different from untreated fish, in terms of these parameters. These differences provide grounds for predicting differential response to sublethal thermal stress for the pretreated and untreated fish. Such response is discussed as it may relate to the effects of chronic sublethal exposure to dieldrin. (Little-Battelle)
W74-01408

DISTRIBUTION OF ALKYL ARSENICALS IN MODEL ECOSYSTEM,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
A. R. Isensee, P. C. Kearney, E. A. Woolson, G. E. Jones, and V. P. Williams.
Environmental Science and Technology, Vol 7, No 9, p 841-845, September 1973. 2 fig, 4 tab, 13 ref.

Descriptors: *Bioassay, Model studies, Toxicity, *Snails, *Waterfleas, Freshwater fish, *Chlorophyta, Absorption, Food chains, Path of pollutants, Distribution patterns, Tracers, Ecosystems, Arsenicals (Pesticides).
Identifiers: Bioaccumulation, Biomagnification, *Cacodylic acid, *Dimethylarsine, *Mosquitofish, Scintillation counting, Macroinvertebrates, Sample preparation, Biological samples, Physa, Daphnia magna, Gambusia affinis, Oedogonium cardiacum, Alkyl arsenicals.

Mosquitofish (Gambusia affinis), waterfleas (Daphnia magna), snails (Physa), and algae (Oedogonium cardiacum) were exposed to C-14-labeled cavodylic acid (CA) and dimethylarsine (DMA), for 3, 29, 32, and 32 days, respectively, in a model ecosystem. The model systems consisted of glass aquaria 25.4 X 5.2 X 17.8 cm filled with 4 liter of standard reference water with increased NH4NO3 and K2HPO4. CA was added directly and DMA was adsorbed on soil and added to the system. After exposure for the specified period, bioaccumulation and biomagnification were determined in the organisms. Algae and Daphnia were ground, combusted in oxygen, and the evolved CO2 assayed for radioactivity by liquid scintillation counting. Fish and snails were homogenized in methanol, filtered, the filtrate concentrated and radioactivity determined by liquid scintillation counting. The organisms thrived in the model system indicating that CA and DMA were not toxic. Lower food chain organisms (algae and Daphnia) bioaccumulated more CA and DMA than did higher food chain organisms (snails and fish). Amounts accumulated indicate that CA and DMA do not show a high potential to biomagnify in the environment. An increase in biomass (primarily algae) over 32 days largely accounted for a gradual loss of CA and DMA from solution. (Little-Battelle)
W74-01409

METABOLISM AND BILIARY EXCRETION OF SULFOBROMOPHTHALEIN BY RAINBOW TROUT (SALMO GAIRDNERI),
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
D. C. Schmidt, and L. J. Weber.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1301-1308, September 1973. 2 fig, 4 tab, 27 ref.

Descriptors: *Animal metabolism, *Rainbow trout, *Bioassay, Dyes.
Identifiers: *Sulfobromophthalein, *Elimination, *Bile, Plasma, Blood, Transport maximum, Excretion.

Biliary excretion of sulfobromophthalein (BSP) by rainbow trout as studied in free-swimming fish and in fish immobilized by spinal transection or anesthetization with M.S. 222. Bile was collected by catheterizing the common bile duct with PE 10 tubing and ligating the cystic duct. Plasma decay of BAP was determined by injecting 5, 10, and 15 mg/kg of BSP in Cortland's saline into the caudal vein. A single blood sample was then obtained by cardiac puncture. BSP and metabolites in bile were measured by colorimetry. The transport maximum (TM) was determined by infusing the dye into a cannulated ventral intestinal vein and collecting bile from the bile duct. Excretion of BSP across gills and into the urine was tested by analyzing water and urine samples. The plasma half-life of BSP was 13 min for doses of 5 and 10 mg/kg and 29 min for a dose of 15 mg/kg. The biliary BSP transport maximum (Tm) averaged 9.6 micrograms min per kg for five fish while the blood clearance averaged 1.7 ml/min per kg for two fish. Normal bile flows of 0.87 microliter/min per kg in trout were increased upon anesthetization but were unaffected in fish allowed to recover from spinal transection. The data presented support the conclusion that the transport of BSP from liver cells to bile is the rate-limiting step in the excretion of this dye. (Little-Battelle)
W74-01411

UPTAKE OF METHYL MERCURIC CHLORIDE AND MERCURIC CHLORIDE BY TROUT: A STUDY OF UPTAKE PATHWAYS INTO THE WHOLE ANIMAL AND UPTAKE BY ERYTHROCYTES IN VITRO,
Michigan State Univ., East Lansing. Dept. of Physiology.
K. R. Olson, H. L. Bergman, and P. O. Fromm.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1293-1299, September 1973. 2 fig, 2 tab, 24 ref.

Descriptors: *Rainbow trout, *Bioassay, Water pollution effects, Animal metabolism, Distribution, Mercury, *Heavy metals, Radioactivity techniques.
Identifiers: *Bioaccumulation, *Mercury compounds, *Metabolic pathways, Methylmercury chloride, Mercury chloride, In vitro tests, Blood, Scintillation counting, Biological samples, Tissue, Gills, Liver, Kidneys, Heart, Muscle, Stomach, Intestine, Sample preparation.

Rainbow trout (Salmo gairdneri) were exposed for 24 hours to 275 mg/l of Hg as HgC12 or CH3HgC1 (both labeled with Hg-203) to determine the uptake pathways and to ascertain some of the properties of mercury interaction with teleost-nucleated erythrocytes. To assess the role of the gastrointestinal (GI) tract, the GI pathway was eliminated in one group of fish by esophageal ligation. After exposure, blood samples were taken, the fish killed, and tissues samples taken from the gills, liver, kidney, heart, skeletal muscle, stomach, and intestine for determination of Hg content. Distribution and cellular uptake of Hg in blood was determined by incubation with either compound and subsequent separation of the cell and plasma components. Uptake of mercury by the fish was not affected by esophageal ligation, and it is concluded that uptake occurs primarily by way of the gills. Methyl mercury enters the fish at a faster rate than the inorganic form and anomalous tissue distribution of these two mercurials suggest that inorganic mercury does not require methylation prior to entry into the fish. In vitro experiments using radioactive mercurials demonstrated high affinity of methyl mercury for red cells, (up to 90 percent was bound to red cells in 40 min). Only 9 percent of inorganic mercury was taken up by red cells, but, this percentage was increased up to 65 percent if the cells were washed and suspended in Ringer solution prior to incubation with mercury. (Little-Battelle)
W74-01412

EFFECT OF SPOIL DISPOSAL ON BENTHIC INVERTEBRATES,
Delaware Univ., Lewes. Coll. of Marine Studies.
W. Leathem, P. Kinner, D. Maurer, R. Biggs, and W. Treasure.
Marine Pollution Bulletin, Vol 4, No 8, p 122-125, August 1973. 1 fig, 1 tab, 11 ref.

Descriptors: *Benthic fauna, Environmental effects, *Dredging, *Water pollution effects, Marine animals, Dye dispersion, Water quality, Soil analysis, Crustaceans, Dominant organisms, Water analysis, Aerial photography, Bottom sampling, Water sampling, Hydrograph analysis, Waste disposal, Marine geology, Marine biology, Currents (Water), Surface waters, Subsurface flow, Bathymetry, Salinity, Chemical analysis, Invertebrates, Carbon.
Identifiers: *Macroinvertebrates, *Spoil disposal, *Delaware Bay, Polychaetes, Nemerteans, Echinoderms, Bryozoa, Species diversity, Species density, Physical oceanography, Pelecypoda, Beach fleas, Hermit crabs, Decapods, Shannon-Weaver diversity index, Species diversity index, Rhodamine B.

Hydraulic dredging and spoil disposal behind the inner breakwater in Delaware Bay were studied along with their gross effects on benthic macroinvertebrates. Rhodamine B dye was used to establish the surface flow pattern during flood and ebb tides. Water analyses and aerial photography (color-band and infrared film) were used to trace dye dispersion. A drogue study was performed simultaneously to determine subsurface current flow. 103 sites were sampled for salinity, oxygen, biological and geological analyses. To evaluate the dispersion of spoils, bathymetric surveys were performed before and after disposal using a Raytheon precision depth recorder. The settling rate of the deposited spoil was determined using a sample taken from the discharge pipe. The water content was measured and compared with samples taken in the area of the final spoil distribution. The dissolved oxygen concentration fell after dredging, approaching the minimum water quality standard of 50 percent saturation for the State of Delaware. Salinity was fairly constant and the temperature range was 5.4-19.6 C. The density of individual macroinvetrates was low and the number of species rarely exceeded 10 0.1 sq m with the greatest damage to these animals occurring in the dreding and dump sites. The total impact of the operation, however, appeared to have been small. (Holoman-Battelle)
W74-01420

AN IMPROVED METHOD OF CELL ENUMERATION FOR FILAMENTOUS ALGAE AND BACTERIA,
Medical Coll. of Ohio, Toledo. Dept. of Microbiology.
For primary bibliographic entry see Field 05A.
W74-01421

THE EFFECTS OF BACTERIA ON THE GROWTH AND REPRODUCTION OF OEDOGONIUM CARDIACUM,
California Univ., Berkeley. Dept. of Botany.
L. Machlis.
Journal of Phycology, Vol 9, No 3, p 342-344, September 1973. 1 fig, 1 tab, 8 ref.

Descriptors: *Cultures, *Reproduction, *Growth rates, Chlorophyta, Bioassay, Plant growth.
Identifiers: *Oedogonium cardiacum, *Corynebacterium, *Pseudomonas putida, Culture media.

Isolates of male and female Oedogonium cardiacum for which defined media had been established were subsequently found to be contaminated with a species of Corynebacterium which failed to grow in the nutrient broth used to test for contamination. After the cultures were rendered axenic through treatment with penicillin G, they failed to develop oogonia or sperm except occasionally at a very low level. The addition of small amounts of the bacterium increased the development of the reproductive structures; however a much more striking increase was obtained by constantly infecting the algal cultures with Pseudomonas putida. Neither of the bacteria increased growth as measured by dry weight; however, the P. putida resulted in the growth of very long filaments in contrast to the short filaments characteristic of both the axenic cultures and those infected with Corynebacterium sp. (Little-Battelle)
W74-01422

OBSERVATIONS ON THE ECOLOGY OF LAMINARIA SINCLAIRII ON THREE NORTHERN OREGON BEACHES,
Arch Cape Marine Labs., Oreg.
J. W. Markham.
Journal of Phycology, Vol 9, No 3, p 336-341, September 1973. 7 fig, 2 tab, 6 ref.

Descriptors: *Marine algae, *Phaeophyta, Environmental effects, *Biological communities, *Ecology, Plant growth, Life cycles, Seasonal, Ecological distribution, Beaches, Marine plants, Growth rates, Dominant organisms, *Oregon, On-site investigations, Tidal effects, Water temperature, Salinity, Sea water, Chlorophyta, Water sampling.
Identifiers: *Laminaria sinclairii, Marine habitats, Laminari setchellii, Phyllospadix scouleri, Gymnogongrus linearis, Bossiella plumosa, Dilsea california, Ptilota pectinata, Ptilota filicina, Plitota asplenioides, Prionitis lyallii, Microcladia borealis, Iridaea, Farlowia mollis, Codium setchellii, Phaeostrophion irregulare.

Laminaria sinclairii (Harvey) Farlow, Anderson and Eaton occurs only on the Pacific Coast of North America and is usually restricted to rocks on beaches subjected to moderate to heavy surf and a large seasonal fluctuation in sand level. It was observed and measured over a 2-year period on 3 such beaches in northern Oregon. Growth rate and relative dominance are greatest in the lowest and most exposedparts of the intertidal zone, where surf action and sand burial are greatest. The sand level begins to build up on the beach in April and continues to rise, burying the plants, throughout the summer, until the first heavy storms in fall again remove the sand. Maximum growth occurs in early summer, prior to burial. The blades are lost in December and regenerated in January. Ripe sori are produced on the old blades just before they are lost and on the new blades just after they appear. The gametophytes which develop from spores produced by these sori apparently do not usually produce sporophytes. In March and April there is considerable production of new stipes and blades from the haptera at the margins of the holdfast and this is apparently the chief means of reproduction. (Holoman-Battelle)
W74-01423

PHYSIOLOGICAL ECOLOGY OF GELIDIELLA ACEROSA (FORSSKAL) FELDMANN ET HAMEL,
Saurashtra Univ., Rajkot, (India). Dept. of Biosciences.
P. S. Rao, and V. B. Mehta.
Journal of Phycology, Vol 9, No 3, p 333-335, September 1973. 2 fig, 13 ref.

Descriptors: *Marine algae, *Rhodophyta, *Plant physiology, Physiological ecology, Laboratory tests, Environmental effects, *Salinity, *Hydrogen ion concentration, Cultures, Plant growth substances, Growth rates, Nitrogen, Phosphates, Sea water, *Nutrients, Plant growth, Marine plants, Ureas, Phosphorus, Bioassay, Benthic flora.

Identifiers: *Gelidiella acerosa, Nutrient sources, Culture media, Indole acetic acid, Sodium nitrate, Sodium dihydrogen phosphate, Gibberellic acid.

The physiological responses to various ecological factors including salinity, pH, and nutritional and growth substances of Gelidiella acerosa have been investigated in reference to its growth along coasts and in lagoons and backwaters. Samples of the alga were collected from tide pools during low tide and cultured in enriched, pasteurized seawater. NaNo3 and urea were used as nitrogen sources and NaH2P04 as the phosphate source. Different concentrations of IAA and GA were also tried on the growth and production of proliferations. Increase in axis length and the number of proliferations produced were criteria for judging physiological responses. NaNO3 was found to be a better nitrogen source than urea and NaH2PO4 was an effective phosphorus source except at 10 mg/l concentration. Growth-promoting substances were necessary to increase production of poliferations and to hasten vegetative growth; IAA was quite effective at 70-85 mg/l whereas GA was relatively ineffective. Salinity concentrations that were 2 and 4 times that of natural seawater and a pH range of 8.2-9.2 resulted, respectively, in proliferations equal to and greater than that of the controls in natural seawater. (Holoman-Battelle)
W74-01424

MODIFICATIONS IN FILTRATION METHODS FOR THE MEASUREMENT OF INORGANIC C-14 UPTAKE BY PHOTOSYNTHESIZING ALGAE,
Kinnerat Limnology Lab., Tiberias (Israel).
For primary bibliographic entry see Field 05A.
W74-01425

ELECTROPHORETIC AND IMMUNOLOGICAL ANALYSES OF SEVEN CHLOROSARCINACEAN ALGAE,
Louisiana State Univ., New Orleans. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-01426

SALINITY ADAPTATION BY DUNALIELLA TERTIOLECTA. I. INCREASES IN CARBONIC ANHYDRASE ACTIVITY AND EVIDENCE FOR A LIGHT-DEPENDENT NA (PLUS)/H (PLUS) EXCHANGE,
State Univ. Coll., Geneseo, N.Y. Dept. of Biology.
A. H. Latorella, and R. L. Vadas.
Journal of Phycology, Vol 9, No 3, p 273-277, September 1973. 4 fig, 3 tab, 23 ref.

Descriptors: *Ion exchange, Hydrogen ion concentration, *Enzymes, Light, *Bioassay, *Sodium, *Cytological studies, Cultures, Aquatic algae, *Salinity, Growth rates, Adaptation, Ions.
Identifiers: *Dunaliella tertiolecta, Carbonic anhydrase.

Cells of Dunaliella tertiolecta adapted to 0.5 M NaCl were axenically cultured to investigate H (plus) incorporation, Na (plus) extrusion, and carbonic anhydrase levels in response to changes in external Na (plus) concentrations. Cell densities were determined with a Celloscope electronic particle counter. The Na (plus) content of cells was determined by flame photometry. Proton incorporation was assessed by changing the salinity of the cell suspension solutions and monitoring the pH change ever 2.5 minutes. Carbonic anhydrase was assayed by bubbling CO2 through the suspensions to decrease the pH and then measuring enzyme activity. When Dunaliella tertiolecta was transferred to higher salinities, there was a lag in growth, suggesting an adaptation period. Since there was no significant difference in the Na (plus) content of cells grown between 0.5 and 3.5 M NaCl, a mechanism for Na (plus) extrusion or exclusion was indicated. Increasing the salinity of cell suspensions stimulated an incorporation of H (plus) by the cells, suggesting an H (plus)/Na (plus) exchange. Cells adapted to higher salinities had increased carbonic anhydrase activity, suggesting that increased CO2 or HCO3 (minus) transport may be required at higher salinities. Growth at salinities above 2.5 M required continuous illumination; therefore a light-driven H (plus)/Na (plus) exchange accompanied by a HCO3 (minus) influx is proposed. (Little-Battelle)
W74-01427

SOME THOUGHTS ON NUTRIENT LIMITATION IN ALGAE,
Dunstaffnage Marine Research Lab., Oban (Scotland).
M. R. Droop.
Journal of Phycology, Vol 9, No 3, p 264-272, September 1973. 14 fig, 15 ref.

Descriptors: *Nutrients, *Limiting factors, *Cultures, *Algae, *Absorption, *Growth rates, *Mathematical models, Equations, Biomass, Plant growth.
Identifiers: Bioaccumulation, Substrates, Luxury consumption.

An empirical relation relating specific growth rate in steady state systems to nutrient status with respect to more than one nutrient simultaneously is proposed, based on 3 experimentally verifiable postulates: (1) that uptake depends on the external substrate concentration; (2) that growth depends on the internal substrate concentration; and (3) in a steady state system specific rate of uptake (in the absence of significant excretion) is necessarily the product of the specific growth rate and internal substrate concentration. The implications of this model are discussed in particular in respect to the concept of luxury consumption and Liebig's law of minimum. Some aspects of uptake in transient situations are also discussed. (Little-Battelle)
W74-01428

ALGAL SUCCESSION ON ARTIFICIAL REEFS IN A MARINE LAGOON ENVIRONMENT IN GUAM,
Guam Univ., Agana. Marine Lab.
R. T. Tsuda, and H. T. Kami.
Journal of Phycology, Vol 9, No 3, p 260-264, September 1973. 6 fig, 1 tab, 7 ref.

Descriptors: *Rhodophyta, *Cyanophyta, *Chlorophyta, *Phaeophyta, Climax, *Succession, Population, Browse utilization, Reefs, Marine algae, Lagoons, Diatoms.
Identifiers: *Artificial reefs, Tires, *Guam.

Two artificial reefs were constructed from automobile tires in a marine lagoon in Guam, one in November 1969 and the other in October 1970, and studied for algal succession from January 1970 to February 1972. Monthly cuttings were taken from the tires for identification and quantification of the algae. The increase in number of additional species found each month was plotted to approximate the time span for climax to occur. A total of 18 species of algae (5 Cyanophyta, 3 Chlorophyta, 6 Phaeophyta, and 4 Rhodophyta) was found at both reefs during the 26-mo period. The algal species were of 2 types-the turf which rarely exceeded 2 mm in height and the macroalgae which exceeded 10 mm in height. The number of species present during any one month varied from 1 to 8. The mean number of species per month was 4.4 and 4.6. Filamentous algae, ie, Calothrix crustacea, Feldmannia indica, and Sphacelaria tribuloides, were the primary colonizers; the fleshy brown alga, Dictyota bartayresii, appeared soon after. Lobophora variegata was the only alga present which occurred seasonally. Low light penetration through the silty lagoon water and selective browsing by herbivorous fishes favored the blue-greens Calothrix crustacea and Microcoleus lyngbyaceus to be the dominant algae in the climax community which occurred within a 1-year period. (Little-Battelle)
W74-01429

KINETICS OF SILICON-LIMITED GROWTH IN THE MARINE DIATOM THALASSIOSIRA PSEUDONANA HASLE AND HEIMDAL (EQUALS CYCLOTELLA NANA HUSTEDT),
Woods Hole Oceanographic Institution, Mass.
R. R. L. Guillard, P. Kilham, and T. A. Jackson.
Journal of Phycology, Vol 9, No 8, p 233-237, September 1973. 1 fig, 2 tab, 26 ref.

Descriptors: *Silicates, *Growth rates, Limiting factors, *Succession, *Bioassay, *Diatoms, Nutrients, Primary productivity, Cultures, Kinetics.
Identifiers: Thalassiosira pseudonana, *Sargasso Sea, Silicon.

The half-saturation constant (K sub s) for growth and the maximum growth rate (mu sub max) were determined for 2 clones of Thalassiosira pseudonana (equals Cyclotella nana) under conditions in which external silicon concentrations controlled growth. The estuarine clone (3H) had a higher half-saturation constant (0.98 micromole Si) and maximum growth rate (3.6 divisions/day) than the clone from the Sargasso Sea (0.19 micromole Si, 2.1 divisions/day). The K sub s values for each clone are such that the silicate levels found at certain times in both the Sargasso Sea and the coastal regions are rate limiting to growth, hence can be of significance to plant production and to species succession. The yield data are consistent with the concept that growth rate and cellular silicon content vary together in silicon-limited cultures. (Little-Battelle)
W74-01431

SUPERSATURATION OF NITROGEN IN WATER DURING PASSAGE THROUGH HYDROELECTRIC TURBINES AT MACTAQUAC DAM,
Environmental Protection Service, Halifax (Nova Scotia).
J. R. MacDonald, and R. A. Hyatt.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1392-1394, September 1973. 2 tab, 6 ref.

Descriptors: *Nitrogen, *Supersaturation, *Air, *Fishkill, *Hydroelectric plants, Water pollution effects, Water pollution sources, Dissolved oxygen, Eels, Salmon, Atlantic salmon, Water analysis, Aeration, *Canada.
Identifiers: Gasometric analyzer, Winkler Method, *Mactaquac Dam (N.B.), American eel.

During 1968, two fish kills occurred below the Mactaquac Hydroelectric Station on the St. John River, New Brunswick. Examination of dead and dying salmon (Salmo salar) and eels (Anguilla rostrata) revealed gas bubbles beneath the skin which is generally associated with supersaturation of water with air. Since the kill occurred at the time of reduced power generation, water above and below the station was analyzed for oxygen and nitrogen saturation under low and high generating conditions. Dissolved oxygen was determined by the Winkler method and nitrogen with a microgasometric analyzer. The results showed that concentrations of dissolved oxygen and nitrogen gases were substantially increased when water passed through the turbine generating system at low generating levels. Concentrations of dissolved nitrogen gas increased by as much as 20 percent above atmospheric equilibrium. (Little-Battelle)
W74-01432

GROWTH RATES OF INTERTIDAL MOLLUSCS AS INDICATORS OF EFFECTS OF UNEXPECTED INCIDENTS OF POLLUTION,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
R. Black.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1385-1388, September 1973. 2 tab, 8 ref.

Descriptors: *Biondicators, *Mussels, Water pollution effects, *Phosphorus, *Growth rates, Toxicity, Animal growth, Snails, *Canada.
Identifiers: *Periwinkles, Macroinvertebrates, Mytilus edulis, Littorian littorea, *Long Harbour (Newfoundland).

Shells of mussels, Mytilus edulis, and periwinkles, Littorina littorea, from several locations were used to determine the effects of phosphorus pollution is Long Harbor, Newfoundland. Such effects were recorded using check marks on the shells. Examination of numerous shells indicated that check marks in both species were probably annual marks. Growth rates of Mytilus in 1969, the year of significant elemental phosphorus pollution at Long Harbour, were no different from those in preceding or succeeding years. No Littorina alive in 1969 occurred at Long Harbour, but they were abundant at other locations. This sort of analysis, used with caution because effects of pollutants may be confounded with effects of other variables, provides a method of examining nonlethal effects of unexpected polluting events. (Little-Battelle)
W74-01434

PROBABLE CAUSES FOR THE 1972 RED TIDE IN THE CAPE ANN REGION OF THE GULF OF MAINE,
New Hampshire Univ., Durham. Dept. of Botany.
H. F. Mulligan.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p 1363-1366, September 1973. 2 tab, 13 ref.

Descriptors: *Distribution patterns, *Meteorological data, *Red tide, *Dinoflagellates, Pyrrophyta, Rain, Upwelling, Environmental effects, Marine algae, Nuisance algae.
Identifiers: *Causative factors, *Gonyaulax tamarensis, Flagellates, *Gulf of Maine.

In an attempt to identify causal factors for the occurrence of the red tide bloom in the Gulf of Main during September 1972, data on spatial, temporal, and vertical distributions of Gonyaulax tamarensis were reviewed for the vicinity of Cape Ann. When considered with meteorological records, the probable causes of the bloom were identified: (1) an upwelling of deep water, (2) development of a seed population of G. tamarensis during unusually dry weather in August, and (3) heavy rainfall in September. (Little-Battelle)
W74-01435

BEHAVIORAL RESPONSES TO CHANGES IN HYDROSTATIC PRESSURE AND LIGHT DURING LARVAL DEVELOPMENT OF THE LOBSTER HOMARUS GAMMARUS,
Marine Biological Station, Port Erin, Isle of Man (England).
G. P. Ennis.
Journal of the Fisheries Research Board of Canada, Vol 30, No 9, p1349-1360, September 1973. 9 fig, 3 tab, 13 ref.

Descriptors: *Lobsters, *Larvae, *Bioassay, *Hydrostatic pressure, Laboratory equipment, Light intensity, Distribution, Depth.
Identifiers: Homarus gammarus, Macroinvertebrates.

Larvae of the lobster, Homarus gammarus, were examined with respect to the role of pressure sensitivity as a depth-regulatory mechanism in an attempt to obtain clues to their distribution in nature. Pressure sensitivity was assessed by placing larvae of different stages in a 76-cm Plexiglass cylinder which could be pressurized with a tire pump. Tests were conducted in darkness and with overhead light of varying intensity. Larvae were also release in the sea and observed by divers. (Little-Battelle)
W74-01436

COUPLING CARBON FLOW THROUGH SOME PELAGIC AND BENTHIC COMMUNITIES,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 05B.
W74-01437

STREAM COMMUNITY RESPONSE TO NUTRIENT ENRICHMENT,
Michigan State Univ., East Lansing. Inst. of Water Research.
R. A. Cole.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1874-1888, September 1973. 3 fig, 6 tab, 33 ref.

Descriptors: Water pollution effects, Inorganic compounds, Natural streams, *Biological communities, *Ecological distribution, Primary productivity, Waste water (Pollution), Periphyton, Benthic fauna, Metabolism, *Pennsylvania, Nematodes, Mollusks, Crustaceans, Aquatic insects, Dominant organisms, Annelids, Aquatic algae, Waste water treatment, Respiration, Sewage effluents, Suspended solids, Chemical properties, Standing crops.
Identifiers: *Spring Creek (Penn), *Species diversity, *Nutrient enrichment, Macrophytes, Macroinvertebrates, Flatworms, Sample preservation, Species diversity index, Enrichment, Orthophosphates, Kjeldahl nitrogen, Reaeration coefficients, Surber sampler, Elodea canadensis, Potamogeton crispus, Crisp pondweed, Bugs, Waterweed, Hirudinea, Pelecypoda, Scuds, Damselflies, Leeches, Tubifex tubifex, Lirceus brachyurus, Sowbug, Planarians, Dugesia doratocephala, Platyhelminthes, Gyraulus, Physa, Chironomus, Ephemerella rotunda.

A study was conducted on Spring Creek in Pennsylvania to examine the effects of inorganic enrichment from the State College wastewater treatment plant. Particular reference was made to the impact of a change in structure of the primary producer assemblage on the community structure and function. Sampling was designed to compare stream sites that were physically similar. Standing crops of macrophytes were estimated at 9 sites and gross primary productivity and community respiration were estimated from diurnal changes in dissolved oxygen concentrations between 2 sampling stations. The sedimented edges of pools and riffles were sampled for macroinvertebrate numbers, weights, diversity, and distribution of species. Fish were sampled by electrofishing and the total standing crop in weight of each size class was calculated. Tests indicated that gross primary productivity was not stimulated by the nutrient addition; biomass of primary producers remained high, while macroinvertebrates and fish were relatively sparse downstream; macroinvertebrate diversity remained unchanged below the gross enrichment; and habitat diversity increased. The study indicated that nutrient enrichment could stimulate productivity and decrease consumer efficiencies. (Holoman-Battelle)
W74-01499

POPULATION DYNAMICS OF POND ZOOPLANKTON, I. DIAPTOMUS PALLIDUS HERRICK,
Kansas Univ., Lawrence. Div. of Biological Sciences.
K. B. Armitage, B. Saxena, and E. E. Angino.
Hydrobiologia, Vol 42, Nos 2/3, p 295-333, August 15, 1973. 1 fig, 10 tab, 75 ref.

Descriptors: Environmental effects, *Kansas, *Zooplankton, *Statistical methods, Life cycles, *Weather, Growth stages, Computer programs, Fecundity, Secondary productivity, Life history studies, Copepods, Water analysis, Reproduction, Nutrients, Surface waters, Water sampling, Invertebrates, Chemical analysis, Bottom sampling, Aquatic plants, Freshwater fish, Animal populations, Water chemistry, Ponds, Crustaceans, Water temperature.
Identifiers: *Diaptomus pallidus, *Population dynamics, Gage Pond (Kan), Population density, Data interpretation, Correlation coefficients, Clarke-Bumpus sampler, Sample preservation, Copepodids, Calanoida, Macroinvertebrates, Chlorophyll a, Nais, Elodea, Notropis, Ictalurus punctatus, Micropterus salmoides, Lepomis cyanellus, Largemouth bass, Green sunfish, Silicon.

The simultaneous and lag relationships between 27 environmental variables and seven population components of a perennial calanoid copepod were examined by simple and partial correlations and stepwise regression. The analyses consistently explained more than 70 percent of the variation of a population component. The multiple correlation coefficient (R) usually was highest in no lag or in 3-week or 4-week lag except for clutch size in which R was highest in 1-week lag. Population control, egg-bearing, and clutch size were affected primarily by enivronmental components categorized as weather; food apparently was relatively minor in affecting population control or reproduction. (Holoman-Battelle)
W74-01502

CHANGES IN SPECIES COMPOSITION OF PHYTOPLANKTON DUE TO ENRICHMENT BY N, P, AND SI OF WATER FROM A NORTH FLORIDA LAKE,
Florida State Univ., Tallahassee. Dept. of Oceanography.
W. A. Gloosechenko, and C. Alvis.
Hydrobiologia, Vol 42, Nos 2-3, p 285-294, August 15, 1973. 4 tab, 18 ref.

Descriptors: *Phytoplankton, Nutrients, *Nitrogen, *Phosphorus, Cyanophyta, Chrysophyta, Pyrrophyta, Chlorophyta, Water sampling, Aquatic algae, Chlorella, Diatoms, Dinoflagellates, Speciation, Biological communities, Water pollution effects, Eutrophication, Seasonal, Cultures, *Florida.
Identifiers: *Lake Jackson (Fla), *Nutrient enrichment, Silicon, Enrichment, Enumeration, Anacystis cyanea, Cosmarium, Lyngbya, Microspora, Desmids, Oedogonium, Oscillatora, Navicula, Aphanizomenon flos-aquae, Botryococcus braunii, Ceratium hirundinella, Hyalotheca muscosa, Nitzschia palea, Pediastrum duplex, Phormidium tenue, Scenedesmus obliquus, Spondylosium planum, Staurastrum paradoxum, Staurastrum pentacerum, Uronema elongatum, Anabaena flos-aquae, Ankistrodesmus falcatus, Asterionella formosa, Dinobryon divergens.

Water samples were collected from Lake Jackson, near Tallahassee, Florada, and enriched with N, P, N plus P, and Si in the laboratory in April, 1969 and January, 1970. After time intervals of 3 and 6 days in April, and 13 days additionally in January, phytoplanktonic algae in the cultures were enumerated as to species composition and cell numbers with an inverted plankton microscope. Controls, to which no nutrients were added, were also maintained to determine changes rising from culture-room conditions. The addition of N and P, alone or in combination, caused increased numbers of algae, along with differences in species composition. This indicated that these two nutrient elements were limiting to production in Lake Jackson besides exerting a chemical control on

succession. Si additions increased diatom numbers, but also stimulated Anacystis cyanea to grow in the April sample. Species attributed as indicators of organic pollution were found to be simulated by inorganic sources of N, P, or Si. Such changes indicated caution must be exercised in interpreting long-term nutrient enrichment experiments using natural phytoplnakton communities. (Holoman-Battelle)
W74-01503

THE STRUCTURE OF AN ACID MOORLAND POND COMMUNITY,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Zoology.
D. Griffiths.
Journal of Animal Ecology, Vol 42, No 2, p 263-283, June 1973. 7 fig, 11 tab, 26 ref, append.

Descriptors: *Biological communities, *Aquatic plants, *Aquatic animals, *Spatial distribution, Invertebrates, Aquatic insects, Newts, Ecological distribution, Mollusks, Distribution patterns, Crustaceans, Nematodes, Annelids, Ponds, Bottom sampling, Methodology, Speciation, Amphibians, Pondweeds, Mosses, Clams, Biomass, Standing crops, Diptera, Midges, Caddisflies, Oligochaetes, Waterfleas, Mites.
Identifiers: *Acid moorland, *United Kingdom (Pen-ffordd-goch Pond), Macroinvertebrates, Bugs, Juncus, Potamogeton, Glyceria, Sphagnum, Glyceria fluitans, Potamogeton polygonifolius, Jancus bulbosus, Juncus effusus, Data interpretation, Chironomids, Alderflies, Ostracods, Seed shrimp, Water boatmen, Water mites, Rushes, Sample preservation, Aeshna, Pyrrhosoma, Notonecta, Sigara, Glaenocorisa, Corixa, Phryganea, Limnephilus spp, Hydroporus spp, Hydrozetes, Cypria, Chydorus, Alona, Ilyocryptus, Cyclops gracilis, Cyclops bicolor, Tripyla.

An investigation was made of the spatial relations between the plants and animals comprising an acid moorland pond community. Samples of plants and animals were taken from Pen-ffordd-goch Pond in spring and autumn with a metal box designed to enclose a vertaical column of water and the surface layer of the substratum. On collection, the samples, consisting of a mixture of mud, plant material and animals, were preserved in Pampel's fluid and sorted in two operations, a purely physical sorting followed by chemical separation. Of the plant species Juncus and Potamogeton were found in the shallow water and Glyceria in the deeper water. There was no obvious difference in the fauna of the two zones and no sharp change in faunal composition corresponding with the floral change. All the animals, except Sialis, has aggregated distributions. This was due to environmental heterogeneity, some areas being more suitable for a species than others. An inverse relationship between the abundances of the animals (in terms of biomass) and the degree of aggregation was demonstrated for the animals from each zone. The associations between plants, plants and animals, and between animals were measured by a rank correlation coefficient. In the Glyceria zone the majority of the animals were associated with the plants. In the Juncus-Potamogeton zone the majority of the animals were associated with the Sphagnum/debris/Juncus complex. Species abundances are compared with various models, the best fit being given by the geometric series. The species size distribution is approximately log-normal. The majority of the animals in the pond were feeding on detritus, very little living vegetation being eaten. (Holoman-Battelle)
W74-01508

ALGAL EXCRETION OF C-14-LABELED COMPOUNDS AND MICROBIAL INTERACTIONS IN CYANIDIUM CALDARIUM MATS,
Wisconsin Univ., Madison. Dept. of Bacteriology.
R. T. Belly, M. R. Tansey, and T. D. Brock.
Journal of Phycology, Vol 9, No 2, p 123-127, June 1973. 4 fig, 23 ref.

Descriptors: *Bioassay, *Bacteria, *Fungi, *Algae, *Bicarbonates, Ecology, Absorption, Proteins, Water temperature, Light, Hydrogen ion concentration, Chlorophyll, Aquatic populations, Biomass, Cultures, Photosynthesis, Laboratory tests, On-site tests.
Identifiers: Excretion, *Cyanidium caldarium, Bacillus coagulans, Dactylaria gallopova.

Because of their low species diversity in hot acid waters, Cyanidium caldarium was used to study bacterial, fungal, and algal interactions in aquatic habitats. Field and laboratory studies included quantification of bacteria, algae, and fungi, determination of protein and chlorophyll content, uptake of C-14-labeled NaHCO3 and excretion of extracellular products. The primary bacterial component of C. caldarium mats is Bacillus coagulans, and the primary fungal component is Dactylaria gallopava. The studies showed that from 2 to 6 percent of the NaHC-14O3 taken up by natural or laboratory populations of the alga was excreted as C-14 labeled materials. However, when excretion was expressed as a percentage of NaHC-14O3 uptake, a higher percentage of the radioactivity was excreted at nonoptimal conditions for NaHC-14O3 uptake. Fungal biomass was directly proportional to algal density, but bacterial numbers varied widely and did not correlate with algal numbers. The bacterial and fungal components could be grown in mixed culture with either growing C. caldarium cultures or in an extract prepared by heating algal cells. (Little-Battelle)
W74-01510

MECHANISM OF NTA DEGRADATION BY A BACTERIAL MUTANT,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05B.
W74-01515

GROWTH AND BUOYANCY OF MICROCYSTIS AERUGINOSA KUTZ. EMEND. ELENKIN IN A SHALLOW EUTROPHIC LAKE,
Freshwater Biological Association, Shrewsbury (England).
C. S. Reynolds.
Proceedings of the Royal Society of London, Series B, Vol 184, No 1074, p 29-50, August 31, 1973. 9 fig, 2 tab, 31 ref.

Descriptors: *Cyanophyta, *Aquatic algae, *Eutrophication, *Lakes, *Plant growth, *Buoyancy, Shallow water, Nutrients, Primary productivity, Plant populations, Thermal stratification, Seasonal, Water temperature, Oxygen, Water sampling, Nitrates, Chemical analysis, Water analysis, Standing crops, Trophic level.
Identifiers: *Microcystis aeruginosa, Survival, Orthophosphates, Vertical distribution, Enumeration.

The growth of Microcystis aeruginosa in a small, shallow eutrophic lake was studied during three consecutive seasons. Standard measurements of temperature, oxygen concentration, and underwater light attenuation were made at weekly intervals. Water samples were analyzed for orthophosphate and nitrate concentrations. Quantitative plankton samples were collected using a 5-m column and population density was estimated by the iodine-sedimentation technique of Lund, Le Crew and Kipling (1958). Liter sedimented samples were used to obtain significant numbers of Microcystis colonies and to determine vertical distribution of the alga. The alga was shown to be continuously present in the plankton throughout the period. Exponential increase in the population was confined to a 5 to 8-week period, following the onset of thermal stratification. Populations appeared to originate near the bottom of the euphotic zone. The possession of an effective light-dependent buoyancy mechanism enabled the alga to maintain station, though progressive deterioration of the photic conditions forced populations to rise and become dissipated within epilimnion. Buoyancy increased after the cessation of growth; surface blooms often led to the physical removal of a majority of colonies to lee shores. Surviving colonies became generally less buoyant after the lake destratified in autumn. (Holoman-Battelle)
W74-01518

CONCENTRATIONS OF SOME TRACE METALS IN PELAGIC ORGANISMS AND OF MERCURY IN NORTHEAST ATLANTIC OCEAN WATER,
Southampton Univ. (England). Dept. of Oceanography.
T. M. Leatherland, J. D. Burton, F. Culkin, M. J. McCartney, and R. J. Morris.
Deep-Sea Research and Oceanographic Abstracts, Vol 20, No 2, p 679-685, August 1973. 1 fig, 3 tab, 29 ref.

Descriptors: Zooplankton, *Zinc, *Mercury, *Neutron activation analysis, Marine fish, *Cadmium, Water analysis, Sea water, Trophic level, Separation techniques, Invertebrates, Copepods, Shrimp, Sharks, Jelly fish, *Trace elements.
Identifiers: *Antimony, *Arsenic, Gas-liquid chromatography, Sample preparation, Electron capture detectors, Methylmercury, Bioaccumulation, Freeze drying, Biological samples, Sample preservation, Tunicates, Decapods, Krill shrimp, Needlefish, Mysids.

Zooplankton and fish, representing different trophic levels, and water were collected mainly from the Northeast Atlantic Ocean for analysis of Sb, As, Cd, Hg, and Zn by neutron activation analysis. Water samples were collected in a plastic bucket and in propylene water bottles, acidified with HCl, and stored in polyethylene bottles. Some organisms were freeze dried, irradiated, digested in sulfuric acid and hydrogen peroxide, and glycine and perchloric acid added to distill the Hg. After the distillate was removed, hydrochloric and hydrobromic acids were added to the main solution, and Sb and As distilled at about 200C and separated by sulfide precipitation. Zn and Cd present in the residual solution were separated by anion exchange of their chloro-complexes. The separated elements were radiochemically purified and converted to suitable forms for gravimetric measurement of chemical yield and counting of beta particles. Other samples were frozen, homogenized, extracted with benzene, back extracted with cysteine acetate solution, and examined by gas-liquid chromatography using an electron capture detector. Concentrations of mercury (0.06 to 0.38 ppm dry weight) showed no clear trend with trophic level. Organomercury analyses on two species showed that the element was present largely in the methylmercuric form. Concentrations of cadmium, which reached 13 ppm dry weight in Systellaspis debilis and Oplophorus sp., and of arsenic, which averaged 25 ppm dry weight in the crustaceans, tended to decrease in the tissues of fishes. Values for antimony which were all below 0.1 ppm dry weight, showed some indication of a similar trend. Concentrations of mercury in seawater from an adjacent area ranged from 17 to 142 mg/l., the highest concentration occurring in deep water. (Little-Battelle)
W74-01523

THE SENSITIVITY OF SUPPRESSED AND UNSUPPRESSED LON STRAINS OF ESCHERICHIA COLI TO CHEMICAL AGENTS WITH INDUCE FILAMENTATION,
Middlesex Hospital Medical School, London (England).
R. James, and N. E. Gillies.
Journal of General Microbiology, Vol 76, No 2, p 429-436, June 1973. 5 fig, 1 tab, 32 ref.

Descriptors: *Toxicity, *E. coli, *Cultures, Varieties, *Organic pesticides, Bioassay, Dyes, Antibiotics (Pesticides), Viability, Genetics.

Identifiers: Nalidixic acid, Gentian violet, Crystal violet, *Penicillin, Sensitivity, Bacterial physiology, Mutants, Organic dyes, Survival, Benzylpenicillin.

The sensitivities of lon strains of Escherichia coli to the filament inducing agents nalidixic acid, gentian violet, crystal violet and penicillin were examined. The strains used included those in which the lon gene is suppressed by sul, exr, and rec as well as strains in which the Lon phenotype is expressed. The sensitivity of the bacteria to agents which act on DNA was reduced when lon was suppressed, but the extent of the decrease in sensitivity was dependent on the mechanism by which suppression was effected. Sensitivity to penicillin, on the other hand, was reduced only in the sul strain and by a mechanism which appears to be independent of the direct suppression of lon. A model to account for these results indicates possible sites at which the lon, sul, exrA and recA genes are expressed. (Little-Battelle)
W74-01524

THE EFFECT OF ALDRIN ON WATER BALANCE IN THE FRESHWATER PULMONATE GASTROPOD (BIOMPHALARIA GLABRATA),
Agricultural Research Council, Brighton (England). Unit of Invertebrate Chemistry and Physiology.
J. A. Cocks.
Environmental Pollution, Vol 5, No 2, p 149-151, September 1973. 2 tab, 2 ref.

Descriptors: *Aldrin, *DDT, *Bioassay, Water pollution effects, Water balance, Insecticides, Animal physiology, Path of pollutants, Pesticide toxicity, Membrane processes, Aquatic animals, Snails, Gastropods, Mollusks, Chlorinated hudrocarbon pesticides, Carbamate pesticides, Phosphothioate pesticides, Animal pathology, Invertebrates, Laboratory tests, Absorption.
Identifiers: *Biomphalaria glabrata, *Orb snails, *Carbaryl, *Malathion, Macroinvertebrates, Bioaccumulation.

Biomphalaria glabrata were kept for 24 h at 26 C in colloidal solutions of aldrin, carbaryl, DDT and malathion in Ringer's containing 0.5 percent gelatine. All four pesticides affected the heart rate and were lethal in 24 h. Of the four pesticides aldrin caused a progressive accumulation of body water over the range tested. At the higher aldrin levels this accumulation resulted in a body water content of 70 percent more than that found in the untreated control animals. Only in the case of aldrin was the impairment of osmoregulation seen, resulting in the accumulation of body water. The swelling was seen during the first few hours of exposure before major decreases in heart beat were produced. On examination of the distended snails, the haemolymph spaces were found to be swollen with fluid. Aldrin appears to interfere with osmoregulation, causing accumulation of fluid in the haemolymph. Whether this fluid accumulates by inhibition of diuresis by the Malpighian tubules, or by increase in water permeability of the body wall, remains to be investigated. (Holoman-Battelle)
W74-01525

THE EFFECT OF CHINA-CLAY WASTES ON STREAM INVERTEBRATES,
Cornwall River Authority, Launceston (England).
P. M. Nuttall, and G. H. Bielby.
Environmental Pollution, Vol 5, No 2, p 77-86, September 1973. 2 fig, 4 tab, 22 ref.

Descriptors: *Invertebrates, *Water pollution effects, *Natural streams, *Aquatic plants, *Water quality, Suspended solids, Aquatic algae, Annelids, Mollusks, Crustaceans, Aquatic insects, Aquatic animals, Industrial wastes, Mosses, Chlorophyta, Benthic fauna, Benthic flora, Tubificids, Water sampling, Pondweeds, Submerged plants, Clams, Snails, Water beetles, Dragonflies, Isopods, Amphipoda, Stoneflies, Mayflies, Caddisflies.
Identifiers: *China clay wastes, Macroinvertebrates, Macrophytes, Water mites, Pond snails, Species abundance, Turbellaria, Sample preservation, Myriophyllum, Ranunculus, Fontinalis, Mougeotia, Crowfoots, Stigeoclonium, Plym River, Yealm River, Tory Brook River, East Looe River, Fowey River, Fal River, St. Austell River, Crinnis River, Par River, Black flies, Horse flies, Soldier flies, Crane flies, Predaceous diving beetles, Riffle beetles, Whirligig beetles, Common skinners, Flatworms, Leeches, Dance flies.

A survey of the macro-invertebrate fauna of rivers receiving china-clay wastes was carried out during 1971-72. A total of 59 samples were taken from 44 sites with a closed triangular net (64 mesh/sq cm) at the riffle sections of the rivers sampled. Samples were preserved in 4 percent formalin for further processing in the laboratory. Rivers polluted by clay waste supported a sparse population of few species. Rooted vegetation was absent, although clean headstreams and unpolluted reaches supported a rich community of aquatic plants. Control streams supported thirty-six times the density of animals found at clay-polluted stations. The composition of species was greater in unpolluted rivers, moorland headstreams and at stations downstream of sewage outfalls compared with clay-polluted reaches. Baetis rhodanii, Perlodes microcephala and the burrowing forms Tubificidae, Naididae and Choronomidae were in greater abundance in clay-polluted reaches. China-clay pollution either eliminated or reduced the abundance of several species frequent in control streams. The poor incidence of plants and macroinvertebrates from rivers receiving china-clay waste was associated with the depositon of fine inert solids derived from the clay extraction process rather than turbidity or abrasion caused by particles in suspension. (Holoman-Battelle)
W74-01527

PARTICULATE METALS IN WATERS OF SORFJORD WEST NORWAY,
Edinburgh Univ. (Scotland). Grant Inst. of Geology.
For primary bibliographic entry see Field 05B.
W74-01528

GROWTH RATES OF SEDIMENT-LIVING MARINE PROTOZOAN AS A TOXICITY INDICATOR FOR HEAVY METALS,
Leeds Univ. (England). Wellcome Marine Lab.
For primary bibliographic entry see Field 05A.
W74-01529

DISTRIBUTION OF (C-14) PCBS IN CARP,
Tokyo Univ. of Fisheries (Japan).
T. Yoshida, F. Takashima, and T. Watanabe.
AMBIO, Vol 2, No 4, p 111-113, 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Polychlorinated biphenyls, *Distribution patterns, *Radiochemical analysis, *Carp, *Bioassay, Radioactivity techniques, Absorption, Freshwater fish, Animal metabolism.
Identifiers: *Scintillation counting, Biological samples, Chlorinated hydrocarbons, Bioaccumulation, Gall bladder, Hepatopancreas, Kidneys, Adipose tissue, Brain, Heart, Blood, Gills, Intestine, Skin, Muscle, Tissue.

Young carp (Cyprinus carpio) were exposed to C-14-labeled PCB's by oral dosage and by addition to water to determine the distribtuion of PCB's in fish. The PCB's used were nearly equivalent to Aroclor 1248. Oral dosage was 6 microcuries of C-14 PCB per fish. In the water exposure experiment, fish were exposed to 2 microcuries per liter for 24 hours. After dosing, the fish were kept in a flowing water tank and fed a PCB-free diet for 7 days to equilibrate the distribution in the fish body. Two fish from each experiment were dissected and the amount of radioactive material in the hepatopancreas, gall bladder, kidney, visceral adipose tissue, adipose tissue of the skull, brain, heart, blood, gill, intestine, skin, and dark and white muscle was determined using an automatic sample oxidizer and liquid scintillation counter. Autoradiographic analysis of whole bodies was used for the remaining samples. The compounds were localized mainly in the gall bladder, adipose tissue and hepatopancreas, but only slight radioactivity was detected in muscle, with the exception of dark muscle. In particular, high radioactivity was detected in the gall bladder and adipose tissue of the skull. In the feeding experiment, a higher radioactivity count was observed in the intestine, especially in the posterior segment. (Little-Battelle)
W74-01530

STUDIES ON METHANOL-OXIDIZING BACTERIA. I. ISOLATION AND GROWTH STUDIES,
Texas Univ., Austin. Dept. of Microbiology.
R. J. Mehta.
Antonie van Leeuwenhoek, Vol 39, No 2, p 295-302, 1973. 7 tab, 16 ref.

Descriptors: *Isolation, *Methane bacteria, *Pollutant identification, *Oxidation, Soil bacteria, Assay, Enzymes, Metabolism, Methane, Water pollution sources, Cultures, Inhibition, Pseudomonas, Manometers, Temperature, Organic compounds, Alcohols, Amino acids, Microbial degradation, Aerobic bacteria.
Identifiers: *Bacterial physiology, *Substrate utilization, *Growth studies, *Methanol, Cyanides, Pseudomonas spp, Enzymatic inhibitors, Formate dehydrogenase, Manometric techniques, Enrichment, Carbon sources, Substrate concentration, Glutamates, Acetates, Citrates, Succinates, Lactates, Oxalates, Glycollates, Formates, Cyanides, Sample preparation, Cell yield, Ethanol, n-Propanol, n-Butanol, Isopropanol, Methylamine, Glycine, Serine, Alanine, Glucose, Fructose, Formaldehyde.

Three methanol-oxidizing bacteria were isolated by enrichment culture technique from soil. Two of them were Pseudomonas spp. The third one was obligate methylotroph. The growth characteristics of the 3 microbes were studied in cultures containing a basal salts medium and an appropriate carbon source. Oxygen uptake by washed-cell suspensions or crude cell extracts was measured in conventional Warbury manometers at 30 C with air as the gas phase. Formate dehydrogenase activity was assayed by measuring the rate of CO2 production by a conventional manometric technique. Cell-suspension experiments with Pseudomonas RJ suggest that methanol-, formaldehyde-, and formate-oxidizing enzymes were present. Formate-oxidizing enzyme was detected only from Pseudomonas RJ. It had a pH optimum of 7.0 and required nicotinamide adenine dinucleotide (NAD) for activity. Cyanide at 0.01 mM concentration inhibited the enzyme activity completely. (Holoman-Battelle)
W74-01535

VIABILITY OF LYOPHILIZED MICROORGANISMS AFTER STORAGE,
Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology.
J. Antheunisse.
Antonie van Leeuwenhoek, Vol 39, No 2, p 243-248, 1973. 2 tab, 8 ref.

Descriptors: *Bacteria, *Yeasts, *Fungi, *Storage, Effects, Pathogenic bacteria, Microorganisms, Pseudomonas, Azotobacter, Aerobic bacteria, Nitrogen fixing bacteria.

Identifiers: *Lyophilization, *Survival, Heterotrophic bacteria, Culture media, Agrobacterium, Beijerinckia, Erwinia, Lipomyces, Microcyclus, Arthrobacter, Brevibacterium, Escherichia, Corynebacterium, Mycobacterium, Rhizobium, Bacillus, Acetobacter, Alcaligenes, Azotobacter agilis, Azotobacter beijerinckii, Azotobacter chroococcum, Azotobacter vinelandii, Brevibacterium linens, Caulobacter, Cellulomonas, Lactobacillus, Leuconostoc, Micrococcus, Mycobacterium, Mycobacterium phlei, Mycobacterium rhodochrous.

Bacteria, yeasts and fungi lyophilized in a dextran-sodium glutaminate solution were stored under vacuum in the dark at room temperature. After 6 years the survival was tested and viability counts were made. Of the 48 genera or groups tested 31 survived well and 9 moderately (respectively, 80-100 percent and 50-80 percent of the strains were still alive). Many strains of the genera Agrobacterium; Azotobacter; Beijerinckia; Erwinia; Pseudomonas; Lipomyces and Microcyclus failed to survive. Lyophilized mushroom mycelium did not grow after 6 years storage. The results of this experiment are compared with those obtained with the same strains preserved on sealed agar slants (Antheunisse, 1972). The results of both methods in relation to some genera are discussed. (Holoman-Battelle)
W74-01538

MICROFAUNA OF ACTIVATED SLUDGE. PART III. THE EFFECT OF PHYSICO-CHEMICAL FACTORS ON THE OCCURRENCE OF MICROFAUNA IN THE ANNUAL CYCLE,
Instytut Gospodarki Kommunalnej, Warsaw (Poland). Pracownia Hydrobiol.
H. Klimowicz.
Acta Hydrobiologica. Cracow, Vol 15, No 2, p 167-188, 1973. 6 fig, 1 tab, 20 ref.

Descriptors: *Activated sludge, *Physicochemical properties, Pollutant identification, *Environmental effects, Domestic sewage, Sewage effluents, Protozoa, Rotifers, Crustaceans, Nematodes, Oligochaetes, Temporal distribution, Dominant organisms, Chemical analysis, Nitrates, Nitrites, Ammonia, Suspended solids, Dissolved oxygen, Air temperature, Hydrogen ion concentration, Biochemical oxygen demand, sampling.
Identifiers: *Sewage microorganisms, *Annual cycles, *Seasonal variation, Characterization, Tardigrades, Gastrotricha, Influents, Organic nitrogen, Flagellates, Arachnids, Amoeba limax, Amoeba proteus, Amoeba gorgenia, Amoeba radiosa, Cochliopodium granulatum, Arcella vulgaris, Euglypha alveolata, Peranema trichophorum, Coleps hirtus, Trachelophyllum pusillum, Litonotus carinatus, Litonotus crinitus, Litonotus fasciola, Chilodonella cucullulus, Chilodonella uncinata, Colpidium campylum Urostyla.

Studies were conducted over a 1-yr period to determine the effect of physiochemical and atmospheric conditions on the development of microfauna in the annual cycle in activated sluge. One hundred and four activated sludge samples were examined immediately after being taken from a Sheffield type aeration tank which receives domestic sewage. Faunistic analyses and the following physiochemical observations were made: concentration and volume of the activated sludge in the aeration tank, temperature of air and sludge, concentration of DO, pH of inflowing and effluent sewage, 5-day BOD, and the amount of suspended solids, ammonia, organic nitrogen, nitrates, and nitrites in the inflowing and effluent sewage. 69 species of microorganisms were identified. It was difficult to determine which fluctuations in the assemblage of the microfauna depended on the technological and which on the atmospheric conditions. The majority of species in the activated sludge appear accidentally in periods which are difficult in anticipate. The remaining species may be divided into frequently and rarely found in the course of the year, and into those characteristic for warm or cold seasons of the year. The rise in temperature from March to September caused a gradual increase in the number of species and the fall in temperature in the cold season an increase in the number of individuals. The number of species and of the individuals representing them depends mainly on the course of the process of sewage purification and to a lesser degree on the season of the year. (See also W72-05732) (Holoman-Battelle)
W74-01542

THE CHEMICAL OXYGEN DEMAND OF WATERS AND BIOLOGICAL MATERIALS FROM PONDS,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
C. E. Boyd.
Transactions of the American Fisheries Society, Vol 102, No 3, p 606-611, July 1973. 6 fig, 12 ref.

Descriptors: *Chemical oxygen demand, Surface waters, *Ponds, *Aquatic algae, Aquatic plants, *Freshwater fish, *Organic matter, Oxidation, Phytoplankton, Aquatic bacteria, Water analysis, Chemical analysis, Oxygen, Water temperature, Euglena, Chlamydomonas, Zooplankton, Chlorophyll, Primary productivity, Water hyacinth, Pondweeds, Carp, Channel catfish, Dissolved oxygen, Water sampling, Alligatorweed.
Identifiers: *Oxygen consumption, Macrophytes, Particulate matter, Sample preparation, Aphanizomenon flos-aquae, Anabaena circinalis, Staurastrum, Nitella, Spirogyra, Elodea densa, Water milfoil, Threadfin shad, Gizzard shad, Stoneworts, Duckweed, Largemouth bass, Bluegills, Wild celery, Spike rushes, Needle rush, White catfish, Scenedesmus dimorphus, Anabaena flos-aquae, Chlorella pyrenoidosa, Ankistrodesmus falcatus, Coelastrum microporum, Pithophora kewensis, Alternanthera philoxeroides, Lemna minor, Eichhornia crassipes.

Water samples were taken from ponds which received feed applications and from fertilized and unfertilized ponds and analyzed to determine if a consistent relationship exists between the COD of pond waters and the rate of oxygen consumption by planktonic organisms. The samples were collected 10 cm beneath the surface with polyethylene bottles and used within 2 hr of collection for the preparation of the following experiments: rate of O2 consumption, COD, and effect of temperature on O2 consumtion. COD determinations were made on unfiltered and the filtrates of filtered water samples. The total amount of O2 required to oxidize fish, algal, and macrophyte samples was determined by COD analysis. The rate of oxygen consumption by organisms in pond waters, as measured by a dark bottle technique for a 24-hr period, increased with increasing chemical oxygen demand (COD). Rate of oxygen consumption increased with temperature between 15 and 35C (Q sub 10 values were 1.5 to 2.0). At the same level of COD, oxygen consumption was greater in unaltered pond water than in water in which the plankton was heat-killed and oxygen was utilized only by bacteria and other decomposers. COD was positively correlated with increasing concentrations of chlorophyll in pond water. The amount of COD in soluble organic matter ranged from 20.2 to 95.0 percent of the total COD. The percentage of the COD in the soluble fraction decreased with increasing quantities of phytoplankton. The average amounts of oxygen (mg oxygen/mg dry wt) required to completely oxidize various types of biological material were: phytoplankton from pure cultures, 1.29; macroscopic algae, 100; higher aquatic plants, 0.99; particulate matter from pond waters 0.98; and fish, 1.19. (Holoman-Battelle)
W74-01543

MICROBIAL FLORA AND LEVEL OF VIBRIO PARAHAEMOLYTICUS OF OYSTERS (CRASSOSTREA VIRGINICA), WATER AND SEDIMENT FROM GALVESTON BAY,
Texas A and M Univ., College Station. Dept. of Animal Science.
C. Vanderzant, C. A. Thompson, Jr., and S. M. Ray.
Journal of Milk and Food Technology, Vol 36, No 9, p 447-452, September 1973. 4 fig, 5 tab, 33 ref.

Descriptors: *Oysters, *Pathogenic bacteria, *Enteric bacteria, Water pollution, *Bottom sediments, *Pollutant identification, Shellfish, Cultures, Iosolation, Dominant organisms, Ecological distribution, Path of pollutants, Aerobic bacteria, Anaerobic bacteria, Fish parasites, Aquatic soils, Soil contamination, Pseudomonas, Soil analysis, Water analysis, Pollutants, Water temperature, Salinity.
Identifiers: *Vibrio parahaemolyticus, Heterotrophic bacteria, Culture media, Plate counts, *Galveston Bay, Aeromonas, Moraxella, Acinetobacter, Flavobacterium, Achromobacter, Bacillus, Micrococcus, Staphylococcus, Enterobacteriaceae, Animal tissues, Biochemical tests, Sample preparation, Trypticase soy broth, Trypticase soy agar, Thoisulfate citrate bile salts sucrose agar.

Oysters taken from Galveston Bay were examined within 6-12 hr after collection in order to obtain some information on the level and type of microbial flora and the distribution of V. parahaemolyticus in oysters, water, and sediment. The shucked oysters were blended and bacterial counts were determined by the spread plate method using trypticase soy agar plates with 3 percent NaCl. Isolation of V. parahaemolyticus was accomplished using oyster-trypticase-peptone homogenate in trypticase soy broth with 7 percent NaCl and subsequently on thiosulfate citrate bile salts surcrose agar plates. MT plates were also used without enrichment for isolations. Aerobic plate counts at 25 C of reshly harvested oysters ranged from 23,000 to 30 million and those of sediment samples from less than 100 to 3 million/g. Counts of water samples were nearly always less than 100/ml. Vibrio, Aeromonas, and Moraxella species predominated in the fresh oysters. Vibrio parahaemolyticus was isolated from 39 to 66 oyster samples and from 9 of 30 sediment and water samples. Isolation was most effective with prior enrichment of samples in trypticase soy broth with 7 percent NaCl and subsequent plating on theiosulfate citrate bile salts sucrose agar. V. parahaemolyticus was detected in only 1 of 8 refrigerated retail oyster samples. Aerobic plate counts at 25 C of refrigerated retail oysters were not much different from those of similar lost shucked under aseptic conditions in the laboratory (Bbefore shucking and washing in the plants). Aeromonas and Moraxella species were predominant in oysters at the retail level. (Holoman-Battelle)
W74-01548

SENSITIVITY OF THREE SELECTED BACTERIAL SPECIES TO OZONE,
Brooke Army Medical Center, Fort Sam Houston, Tex. Health Care Research Div.
For primary bibliographic entry see Field 05F.
W74-01553

BIODEGRADATION OF PHENYLMERCURIC ACETATE BY MERCURY-RESISTANT BACTERIA,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01555

THE PLANKTONIC ASSOCIATION (CLADOCERA AND COPEPODA) OF A DIMIC-

TIC LAKE OF THE LAURENTIDES PARK, QUEBEC, (IN FRENCH),
Laval Univ., Quebec.
For primary bibliographic entry see Field 02H.
W74-01558

INCREASE OF RESISTANCE OF CARP TO DROPSY BY MEANS OF BREEDING. II. COURSE OF SELECTION AND EVALUATION OF THE BREED GROUPS, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
V. S. Kirpichnikov, and K. A. Faktorovich.
Genetika. Vol 8, No 5, p 44-54. 1972. Illus. (English summary).
Identifiers: Breeding, *Carp, *Dropsy, Genes, Genomes, Growth, Hybrids, Pools, Selection, Strains, *USSR (Krasnodar Territory).

The breeding of carp for the resistance to dropsy in the Krasnodar Territory (USSR) was in progress for 8 yr. Breeding procedures were performed with 3 breed groups: Ropshian carps possessing a considerable proportion of genes from the gene pool of Amur wild carp in their genome, local scattered carps and the hybrids of the Ropshian and the Ukranian carps. During breeding procedures, the Ropshian carps underwent selection for dropsy resistance through 2 generations, while all the other breed groups underwent it in 1 generation. Hybrids between the Ropshian carp and the local scattered carps proved best with respect to growth rate and resistance to dropsy, while the scattered carps were the worst. Fairly good results were obtained with hybrids between the Ropshian and the Ukranian carps. The good characteristics of the inter breed hybrids suggest the urgency of future parallel breeding work with 2 or 3 breed groups with the subsequent use of the heterotic interbreed hybrids for commercial purposes.--Copyright 1973, Biological Abstracts, Inc.
W74-01560

A FIRST RECORD OF RED-WATER PHENOMENON IN KASHMIR, INDIA,
Kashmir Univ., Srinagar (India). Dept. of Zoology.
S. M. Das, and Nisar A. Jan.
Kashmir Sci, Vol 7, No 1/2, p 45-47, 1970, Illus.
Identifiers: Chromatophores, *Euglena-rubra, *India (Kashmir), Record, *Red water, Water pollution effects.

Large expanses of freshwater both permanent and transient were observed, completely covered with a thick red mantle. These waters were devoid of all other life normally supported. The responsible organism was identified as Euglena rubra. These possess a layer of red chromatophores spread throughout the cell body. The estimated Euglena population of a 4-acre shallow water body was about 160,000,000.--Copyright 1973, Biological Abstracts, Inc.
W74-01564

HYDROBIOLOGICAL STUDIES ON THE LEDNICKE RYBNIKY PONDS: SPECIES COMPOSITION AND SEASONAL VARIATION IN THE ABUNDANCE OF PLANKTON (IN CZECH),
Brno Univ. (Czechoslovakia). Hydrobiologicka Laborator.
B. Losos, and J. Hetesa.
Prirodoved Pr Ustavu Cesk Akad Ved Brne, Vol 5, No 10, p 3-54, 1971, Illus.
Identifiers: *Algae, Biocenoses, Chemical composition, *Czechoslovakia (Lednicke-Rybniky Ponds), *Hydrobiological studies, Plankton, Planktonic abundance, Ponds, Seasonal, Species, Zooplankton, *Cyanophyta.

After a rather long break, hydrobiological investigations were resumed on the Lednicke rybniky Ponds (Southern Moravia, Czechoslovakia) during 1956-1962. Besides the structure and development of planktonic biocenoses, investigations also involved the chemical composition of water. Particular attention was paid to the differential species composition and abundance of plankton in individual ponds and in successive years; to the development and composition of blue-green algae water blooms; and to individual types of zooplankton during the growing season. The results of the above observations are compared with the data forwarded by earlier authors, and the changes that had arisen within the past 30 yr.--Copyright 1973, Biological Abstracts, Inc.
W74-01567

THE RELATIONS OF PERIPHYTIC AND PLANKTONIC ALGAL GROWTH IN AN ESTUARY TO HYDROGRAPHIC FACTORS,
Washington Univ., Seattle. Dept. of Civil Engineering.
E. B. Welch, R. M. Emery, R. I. Matsuda, and W. A. Dawson.
Limnol Oceanogr, Vol 17, No 5, p 731-737, 1972, Illus.
Identifiers: *Algal growth, Chlorophyll, Estuaries, Hydrographic studies, Light, Nitrogen, *Periphytic algae, Phosphorus, *Planktonic algae, Seasons, *Washington (Duwamish estuary).

The seasonal periodicity of periphyton growth in the Duwamish estuary (Washington), is compared with that of phytoplankton and lends support to a previous conclusion that hydrographic conditions determine the timing of phytoplankton blooms despite high concentrations of dissolved N and P. Accumulation of periphyton on substrates increased in June and July to around 10 microgram chlorophyll a cm-2 wk-1 and is related to incident light; conversely, phytoplankton blooms were delayed until Aug. and Sept. when hydrographic conditions were optimum for biomass accumulations of from 30-70 microgram chlorophyll a/l. Maximum growth of periphytic and planktonic algae occurred at the same location in the estuary. This similarity in spatial distribution is not directly related to hydrographic conditions since the periphyton algae are sessile and more resistant to washout. The water in this section of the estuary presumably contained a more adequate supply of one or more limiting nutrients than water from adjacent locations.--Copyright 1973, Biological Abstracts, Inc.
W74-01571

ECOLOGICAL IMPACT OF PESTICIDES,
Cornell Univ., Ithaca, N.Y. Dept. of Entomology.
D. Pimentel.
Environ Biol, Vol 72, No 2, p 1-27, 1972.
Identifiers: Animals, Bird, *Ecological impact, Fish, Insects, *Pesticides, Plants, *Environmental effects, Ecosystems.

The ecological effects of pesticides (insecticides, herbicides, and fungicides) were analyzed and an assessment made of the extent of damage to the diverse processes of the environmental life system. Some pesticides reduced some species population numbers in certain regions, altered the natural habitat under some conditions, influenced the normal behavior including learning in animals, stimulated or suppressed growth in animals and plants, increased or decreased the reproductive capacity of animals, altered the nutritional content of foods, increased the susceptibility of certain animals to disease, and were concentrated in certain animals to a level 100,000 times that in the environment. The available evidence suggests that certain current pesticide usage methods have caused measurable damage to some species of birds, fishes, and beneficial insects. The full extent of damage is impossible to assess accurately because only a few (less than 1000) species of plants and animals have been studied. Although data on the detrimental effects of pesticides on the life system are spotty, there is sufficient evidence for concern about pesticide use. To avoid compounding the mistakes of the past, caution should be exercised in employing any pesticide with the following characteristics: pesticides which can be easily concentrated in living organisms; pesticides which can be passed from link to link in the food chain and stored in the life system; and pesticides which persist in the environment.--Copyright 1973, Biological Abstracts, Inc.
W74-01573

SWIMMING ENDURANCE AND RESISTANCE TO COPPER AND MALATHION OF BLUEGILLS TREATED BY LONG-TERM EXPOSURE TO SUBLETHAL LEVELS OF HYDROGEN SULFIDE,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
D. Oseid, and L. L. Smith, Jr.
Trans Am Fish Soc, Vol 101, No 4, p 620-625, 1972, Illus.
Identifiers: *Bluegills, *Copper, Endurance, Exposure, *Hydrogen sulfide, Long-Term effects, *Malathion, Resistance, Sublethal levels, Swimming endurance.

After 126 or 148 days of exposure to H2S concentrations ranging from 0.0004 to 0.0146 mg/l, young-of-the-year bluegills were tested for swimming endurance and resistance to Cu or malathion. Swimming tests at low speeds indicated increased endurance for fish exposed to .0004 mg/l H2S, but fish exposed to higher concentrations had less endurance than the controls. In the testw conducted at higher speeds, fish in all test concentrations showed less endurance than the controls. Resistance to Cu was increased by exposure to H2S, but resistance to malathion was not affected except in the lowest test concentration. The chronic exposure to H2S reduced growth in the highest concentration, and gill irrigation rate increased with increased concentrations.--Copyright 1973, Biological Abstracts, Inc.
W74-01579

THE VEGETATION OF FINDLEY LAKE BASIN,
Washington Univ., Seattle. Dept. of Botany.
R. Del Moral.
Am Midland Nat. Vol 89, No 1, p 26-40. 1973, Illus.
Identifiers: *Abies-Amabilis, Biological, Bryophytes, Lakes, *Tsuga-Mertensiana, *Washington (Findley Lake) *Vascular plants.

The vascular plant vegetation of the Findley Lake Basin, King Co., Washington, is described and mapped. This pristine basin ranges in elevation from 1128 to 1350 m. The forested portions of the basin are typical of the Abies amabilis and the lower Tsuga mertensiana vegetation zones, and are divided into 3 community types. Five distinct non-forested community types occupy special edaphic situations. These include a wet meadow, a structurally more complex mesic meadow, a depauperate dry meadow, a bryophyte-dominated talus community and a shrub community. Some structural characteristics of each type are discussed. The dominance of A. amabilis increases from dry ridge tops to the mesic lower slopes of the basin. This pattern reflects differences in rates of forest development along this transect. Because it is pristine and similar to A. amabilis forests in other parts of Washington, this basin is being used in studies of productivity and mineral cycling as part of the USA IBP (International Biological Program) effort. The site should be preserved as a representative of a rapidly diminishing resource.--Copyright 1973, Biological Abstract, Inc.
W74-01587

METALIMNIC LAYER IN LAKE KINNERET, ISRAEL,
Kinneret Limnology Lab., Tiberias (Israel).
C. Serruya.
Hydrobiologia. Vol 40, No 3, p 355-359. 1972.

Identifiers: *Israel (Lake Kinneret), Lakes, *Metalimnic layer, *Iron, *Manganese Sulfur bacteria, Cyanophyta.

Chemical and biological investigations of Lake Kinneret showed that reducing conditions prevailing in summer in the metalimnion cause an early and intense denitrification process accompanied by the release of dissolved Fe and Mn. These conditions are favorable to the development of sulfobacteria and blue-green algae. The role of this layer is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01598

DISTRIBUTION AND MORPHOLOGICAL VARIATION OF LAMPSILIS RADIATA (PELECYPODA, UNIONIDAE) IN SOME CENTRAL CANADIAN LAKES: A MULTIVARIATE STATISTICAL APPROACH,
Manitoba Univ., Winnipeg. Dept. of Zoology.
For primary bibliographic entry see Field 02H.
W74-01608

A MATHEMATICAL MODEL OF PRIMARY PRODUCTIVITY AND LIMNOLOGICAL PATTERNS IN LAKE MEAD,
Arizona Univ., Tucson.
L. G. Everett.
Natural Resources System Series, Technical Report No. 13, Department of Hydrology and Water Resources, September 1972. 151 p, 46 fig, 12 tab, 60 ref.

Descriptors: *Primary productivity, *Mathematical models, *Lake stages, *Dissolved solids, *Phytoplankton, Aquatic environment, Water quality, Colorado River, Aquatic microbiology, Pollutants, Zooplankton, Colorado River Basin, Water pollution sources, Salinity, Algae.
Identifiers: *Lake Mead.

Objectives were to analyze the biotic and abiotic components of Lake Mead, and to develop methodology for diagnosing changes in biological productivity as it relates to physical and chemical changes in the aquatic system. Progressive increases in concentration of dissolved solids in the Colorado River, as much as 2-3 times between the Green River in Wyoming and the Imperial Dam, seem to alter plankton dynamics and the biological productivity of the river. A reliable model to predict future trends is needed to support alternative developmental plans for the lower basin. Lake Mead, the largest surface water body in the basin, represents a system of wide variability in limnological conditions, requiring analysis to depict the influences of past activities and to produce a sound base for forecasting environmental effects of its development. This model shows that planktonic organisms may indicate the presence of water probelms. Macro-and micro-nutrient analyses reveal that primary productivity is not inhibited by limiting concentrations. Tested with one set of independent data, this model appears to be worthy of management utility, but while working well for Lake Mead, needs to be tested with independent data. (Muller-Arizona)
W74-01630

METABOLIC EFFECTS OF DRINKING BRACKISH WATER,
Central Negev Hospital, Beersheba (Israel).
G. M. Berlyne, and M. Morag.
Desalination, Vol 10, No 2, p 215-219, April 1972. 4 tab, 10 ref.

Descriptors: *Urine, *Public Health, Ureas, Brines, Arid Lands, Arid Climates, Saline water systems, Salinity, Water pollution effects, Potable water, Domestic water, *Human Diseases, Water quality, *Brackish water.
Identifiers: *Israel (Arava Rift Valley).

Brackish water is common in arid areas, in the form of surface ponds, saline water table and saline artesian aquifer groundwaters, and saline surface streams. Such saline waters may be the only water available. Brackish water in the Arava Rift Valley in Southern Israel has a high sulphate and magnesium content. The inhabitants who drink this water have been found to have hypocalcaemia and hyperphosphataemia suggestive of parathyroid hypofunction. They also have been found to have low urinary pH, massive urinary sulphate excertion, and a compensated metabolic acidosis. It is suggested that the low urinary pH may be one of the reasons for the high incidence of uric nephrolithiasis in the region. At present potable water quality standards are in terms of concentration, without reference to the quantity of such water consumed. In view of the large volumes of fluid drunk in hot and dry climates, and of the potential deleterious effects of the salts as outlined above, standards for drinking water should be redefined in terms of daily intake of ions rather than in terms of the standards currently used. (Muller-Arizona)
W74-01632

FRESHWATER MUSSEL ECOLOGY, KENTUCKY LAKE, TENNESSEE, MAY 1, 1969--JUNE 15, 1972,
Tennessee Game and Fish Commission, Nashville.
P. Yokley, Jr.
Available from NTIS, Springfield, Va 22151 as COM-73-10619 Price $3.00 printed copy; $1.45 microfiche. National Marine Fisheries Service Cooperative Project 4-46-R, 1972. 133 p, 53 fig, 22 tab, 11 ref.

Descriptors: *Ecology, *Water pollution effects, *Mussels, *Tennessee River, Correlation analysis, Ecosystems, Water pollution sources, Mercury, Sampling, Chemical analysis, Lakes, Fish populations, Growth rates.
Identifiers: *Tennessee (Kentucky Lake).

A study of the ecology including species distribution, densities, growth rates, and spawning of freshwater mussels in the Tennessee River, Kentucky Lake, Tennessee has revealed significant information that can serve as a basis for measuring future changes in water quality and habitat in this 160-mile stretch of the Tennessee River below Pickwick Dam. The 5 mile freshwater mussel sanctuary immediately below Pickwick Dam has revealed that protecting a habitat can help maintain a naiad fauna against exploiting commercial uses. Data indicate that some mussel species are successfully propagating and adapting to the impounded conditions that exist along the length of the Tennessee River today. There are indications that acid water pollution has seriously damaged the mussel shells especially in the deeper areas of slower moving water. Also, some mussel populations have been eliminated by pollutants in past years as indicated by dead shells along specific lengths of the river. Enough remaining small mussel populations still exist along the river to use as monitoring organisms and indicators of further pollution. A commercial species, Fusconaia ebena, is abundant enough and sufficiently supported to make commercial harvesting profitable. (Woodard-USGS)
W74-01641

5D. Waste Treatment Processes

RECREATIONAL REUSE OF MUNICIPAL WASTEWATER,
Texas Tech Univ., Lubbock. Water Resources Center.
W. T. Winn, Jr., D. M. Wells, and R. M. Sweazy.
Available from the National Technical Information Service as PB-225 154/4, $3.50 in paper copy, $1.45 in microfiche. Interim Report WRC-73-1, July 1973. 48 p, 12 fig, 2 tab, 9 ref. OWRR C-4270 (No 9043) (1).

Descriptors: *Water reuse, *Waste water disposal, *Eutrophication, Chlorophyta, *Groundwater, Chrysophyta, *Algae, Nutrients, *Texas, *Recreation, Water quality.
Identifiers: *Lubbock (Tex), Canyon Lakes Project (Tex), *Municipal waste water.

The second reuse of municipal wastewater for recreational purposes is becoming a reality in Lubbock, Texas where a series of small lakes will be fed with percolated wastewater which was reused previously for irrigation. In conjunction with the city's project, Texas Tech University has constructed a model of the Canyon Lakes Project consisting of nine ponds 16 x 8 x 6 ft deep fed with percolated wastewater of comparable quality and stocked with channel catfish. Several chemical parameters of H2O quality (COD, NO3, PO4, CO2 and DO) are monitored on a frequent basic along with the daily logging of physical events in an attempt to provide the City with valuable information concerning possible problems and solutions surrounding the project. Only preliminary work has been done on the pilot scale study. Additional studies are in progress.
W74-01103

WATER QUALITY EVALUATION OF REGIONALIZED WASTEWATER SYSTEMS,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
B. J. Adams, and R. S. Gemmell.
Available from the National Technical Information Service as PB-225 167/6, $5.50 in paper copy, $1.45 in microfiche. Water Resources Center, University of Illinois, Urbana, Research Report No. 70, 1973. 193 p, 36 fig, 45 tab, 82 ref. OWWR A-050-ILL (1). 14-31-0001-3076.

Descriptors: *Water quality management, *Regional analysis, *Illinois, *Waste water treatment, Performance, Economics, Treatment facilities, Regional planning, Systems analysis, Stochastic processes, Simulation analysis, Model studies, Evaluation.
Identifiers: Chicago (Ill), *Regional waste water systems.

A water quality evaluation of regional wastewater system centralization was undertaken to test the hypothesis that water quality improvement may result from the spatial and temporal variations of wasteloads attributed to decentralized regional systems. The evaluation employed water quality models developed for both deterministic and stochastic analyses. Each analysis considered a set of experiments which involved a determination of the water quality resulting from alternative degrees of regional wastewater aggregation. The experiments treated not only the degree of aggregation or equivalently the number of plants in the system but also the stream system length as an indicator of regional morphology and the streamwater/wastewater dilution ratio as an indicator of relative stream size. The water quality assessment was made in terms of the minimum dissolved oxygen level experienced by the system. With a water quality evaluation of regional wastewater system centralization completed, an economic evaluation was undertaken. Cost functions for regional wastewater system components were developed, and costs of the physical systems hypothesized in the water quality analyses were estimated with these cost functions. Finally, a comparison was made between the water quality impact of various regional wastewater systems and the economic impact of these systems. It was concluded that substantial benefits, both economic and water quality, may result from decentralized regional wastewater systems.
W74-01107

EVALUATION OF THE BIO-DISC TREATMENT PROCESS FOR SUMMER CAMP APPLICATION,
West Virginia Univ., Morgantown. Dept. of Civil Engineering.

W. A. Sack, and S. A. Phillips.
Copy available from GPO Sup Doc as EP1.23:670-73-022, $1.05; microfiche from NTIS as PB-225 126/2, $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-022, August 1973. 76 p, 30 fig, 8 tab, 9 ref. EPA Project S-800707.

Descriptors: *Waste water treatment, *Biological treatment, *Nutrient removal, Recreation facilities, *Nitrogen, *Phosphorus, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Treatment facilities.
Identifiers: *Bio-disc treatment, Process, Rotating biological contractor, Tauchtropkorper.

The bio-disc wastewater treatment process was evaluated during operation for one summer at a recreational camp. The bio-disc section consisted of four stages, each of 22 polystyrene discs 1.98 m (6.5 ft) in diameter, and was preceded by a septic tank that served to handle both the primary and the biological sludge produced. Evaluation of the plant included time required for start-up, organic removal efficiency, response to flow variations, nutrient removals, aesthetic impact, and required maintenance and operation attention. Overall organic removals reached essentially full efficiency by the end of the first week of operation. However, removals across the bio-disc section continued to increase somewhat till about the fifth or sixth week of operation. Average bio-disc unit percent removals were BOD - 84.5, COD - 71, TOC - 71, and suspended solids - 75. Average overall plant percent removals were 87.5, 79, 75, and 97.5 respectively. Total nitrogen removal through the plant averaged 40.3 percent. Ammonia nitrogen removal in the disc section was only 25.2 percent. Overall total phosphorus removal was 15 percent. Maintenance and operational requirements for the plant were minimal requiring an average of 1.3 hours per week during the summer. (EPA)
W74-01118

REMOVAL OF PHOSPHATE AND SECONDARY B.O.D. FROM TERTIARY TREATED WASTEWATER BY AQUATIC ANIMALS,
Arizona Univ., Tucson.
C. D. Ziebell.
Available from the National Technical Information Service as PB-225 210/4, $3.50 in paper copy, $1.45 in microfiche. Project Completion Report, August 1971. 13 p, 1 fig, 3 tab, 5 ref. OWRR A-019-ARIZ (1). 14-31-0001-3203.

Descriptors: Water pollution control, *Waste water treatment, *Municipal wastes, Phosphates, Aquatic life, Fish, Aquatic plants, Ecosystems, Waste assimilative capacity, Water reuse, Fisheries, *Biochemical oxygen demand, *Aquatic animals.
Identifiers: *Phosphate removal.

Various organisms were tested for their ability to remove the orthophosphate ion from solution. After preliminary testing of fish, several aquatic plants, algae and clams, a system of natural algal succession and beds of the oriental clam Corbicula fluminea Muller was chosen. Experiments were conducted under controlled conditions at phosphate concentrations of 5.0, 10.0, and 15.0 mg/liter. The results indicated that this system can remove the phosphate ion to below 0.30 mg/liter in 16 days or less and yield a clear effluent acceptable for reuse. A potential fishery and possibly other water-based recreation appears feasible. Originally this research was to be conducted with tertiary treated municipal wastewater, but completion of the city facility was delayed and consequently it was necessary to simulate 'wastewater' by adding phosphates and nitrates to local well water. (Woodard-USGS)
W74-01124

VORTEX CONCEPT FOR SEPARATING OIL FROM WATER,
United Aircraft Research Lab., East Hartford, Conn.
For primary bibliographic entry see Field 05G.
W74-01148

STUDY OF WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS: VOLUME 1 - FINAL REPORT SUMMARY,
Grumman Aerospace Corp., Bethpage, N.Y.
C. A. Guarneri, A. Reed, and R. E. Renman.
Available from NTIS, Springfield, Va 22151, N73-19158 - Price $3.00 printed copy; $1.45 microfiche. National Aeronautics and Space Administration, Contract Report CR-128857, 1973. 28 p, 8 fig, 2 tab. NAS-9-12503.

Descriptors: *Water reuse, *Waste water treatment, Water resources development, Model studies, Economics, Water utilization, Community development, Surveys, Evaluation, Land use, Land development, Costs, *Solid wastes.
Identifiers: Commercial equipment, *Aerospace technology, Community models.

During the past decade, the NASA, and aerospace and commercial industries have been concurrently advancing water and waste management technology. This study explores the application of advanced concepts for water recovery and solid waste processing systems for residential use. Its objective is to define a system concept which offers the best potential for near term and future usage. Concepts are developed and evaluated within the context of a total system that would provide all necessary utilities to a 'free standing' community. For this study a community model consisting of 500 newly constructed low rise apartment units with four occupants per unit has been assumed. The study was initiated with a regional overview of water resource factors as they affect new community planning. Determinations of residential water use and waste generation rates were also made. (Woodard-USGS)
W74-01280

1968 INVENTORY OF MUNICIPAL WASTE FACILITIES, A COOPERATIVE STATE REPORT: REGION 5, ILLINOIS, INDIANA, MICHIGAN, MINNESOTA, OHIO, WISCONSIN.
Environmental Protection Agency, Washington, D.C. Office of Water Programs.

Available from GPO, Washington, D.C., 20402, Price $2.00. EPA Publication No OWP-1, Vol 5, 1971. 249 p.

Descriptors: *Waste water treatment, *Municipal wastes, *Treatment facilities, Documentation, Classification, Indexing, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, Sites, Waste water disposal, Sewage effluents, Industrial wastes, Streams, *Great Lakes region.

The municipal waste facilities described in this publication (10 volumes of which this report is Vol 5) are those reported by the States and Territories of the United States as being in place on January 1, 1968. The data presented were collected by the various State and Territorial water pollution control agencies and processed through the Regional and Headquarters offices of the Federal Water Pollution Control Administration (now Environmental Protection Agency). Volume 5 includes waste facilities in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. A facility is defined as a treatment plant, or, where wastewater is discharged raw, the collection system, for dispoal of domestic and industrial wastewaters. The facilities reported are those associated with municipal-type operations. Facilities are listed alphabetically within States by community or, where a sanitary district, public utility district, etc., is concerned, by the name of that entity. Following the listing of individual facilties there is for each State a summary of plants serving communities other than their own with the names of the 'served' communities. (Woodard-USGS)
W74-01282

IMPROVED WASTE DISPOSAL UNIT,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
H. H. Rosen.
Available from NTIS, Springfield, Va., 22151, AD-758 842 Price $3.00 printed copy; $1.45 microfiche. Technical Report No LWL-CR-04B71, March 1973. 21 p, 16 fig, 1 append.

Descriptors: *Sewage disposal, *Environmental sanitation, Environmental control, Water pollution control, Design, *Waste disposal, Specifications, Structural engineering, Military aspects, *Septic tanks, *Waste water treatment.
Identifiers: Latrines.

In Vietnam the practice of using burn-out type latrines proved to be highly unsatisfactory. The requirements for ecological acceptability for systems accentuated the search for new developments in waste disposal. The septic tank principle is an acceptable solution to the problem. The principle has been in effective use for a long time and as applied here, without the large quantities of flush water generally associated with home use, even soils with poor percolation are amenable to this system. Using this principle, an inexpensive and disposable unit, compact, light weight, but capable of handling the waste of up to two hundred men per day, is described. The system, weighing approximately 125 pounds, consists of a 4 ft x 2 ft x 2 ft fiberglass box and lid with plastic piping. It is field assembled without special tools and requires only the digging of a trench and the fabrication of a latrine box for its emplacement. (Woodard-USGS)
W74-01284

PRESSURIZED SEWER COLLECTION SYSTEMS,
Illinois Inst. for Environmental Quality, Chicago.
J. Leckman.
Available from NTIS, Springfield, Va., 22151, PB-216 166 Price $3.75 Printed copy; $1.45 microfiche. Illinois Institute for Environmental Quality, Chicago, Contract report, November 1972. 36 p, 1 fig, 4 tab, 11 ref.

Descriptors: *Sewerage, *Sewage treatment, *Sewers, *Domestic wastes, Pumps, Pipes, Design criteria, Pressure, Costs, Installation costs, Maintenance costs, *Waste water treatment.
Identifiers: *Pressurized sewers, Grinder pump equipment.

The grinder pump/pressurized collection systems have different characteristics than a conventional gravity sewage system. For example, the wastewater is stored at the home site and then discharged at a uniform rate at some future time that is not necessarily related to consumption of the water; consequently, sewage discharge is not as directly related to water consumption as it is in a gravity sewage collection system. Also, being in a pressurized system, infiltration is not encountered; therefore, the total volume of water delivered to a sewage treatment plant is considerably less. The commercial grinder pump package unit generally consists of a grinder, pump, shut off valve, check valve, electrical controls, fiberglass or stell housing, and accessories to make the unit completely operable with only the electrical power connections and sewer inlet-outlet connections required for field installation. The cost for the package unit with installation is between $1,000 to $1,500 depending on the manufacturer selected and whether an indoor or outdoor location is used. Monthly operational cost of

a pump grinder unit is minimal and consists primarily of the cost of electricity. (Woodard-USGS)
W74-01286

A MODIFIED FILTRATION METHOD FOR THE ANALYSIS OF WASTEWATER SUSPENDED SOLIDS,
Metropolitan Denver Sewage Disposal District No. 1, Commerce City, Colo.
For primary bibliographic entry see Field 05A.
W74-01318

HEAVY METALS IN WASTEWATER AND TREATMENT PLANT EFFLUENTS,
Interstate Sanitation Commission, New York.
For primary bibliographic entry see Field 05A.
W74-01319

FATE OF LIGNIN IN KRAFT EFFLUENT TREATMENT,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W74-01320

NUTRIENT REMOVAL USING LEMNA MINOR,
Florida Dept. of Pollution Control, Tallahassee.
For primary bibliographic entry see Field 05C.
W74-01321

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM.
LBC and W Associates, Columbia, S.C.

Final report prepared for Isothermal Planning and Development Commission, Rutherfordton, N.C., July, 1973. 123 p, 5 maps, 22 tab, 3 append. HUD Grant NCP-1006-NM2.

Descriptors: *Planning, *Water supply, *Sewerage, *North Carolina, Water demand, Water quality, Environmental effects, Waste water treatment, Treatment facilities.
Identifiers: *Utility extension, Goals, Cleveland County (N.C), Rutherford County (N.C.), Polk County (N.C.), McDowell County (N.C.).

This comprehensive planning report identifies existing water supply and distribution facilities, wastewater collection and treatment facilities, projects trends in population growth and land use, sets environmental goals, objectives, and criteria for planning, and recommends general programs for improving water and sewerage services. The area consists of Cleveland, Rutherford, Polk, and McDowell Counties, N. C., located between Asheville and Charlotte. Twenty-five organizations supply water to residences within the region, serving 53% of the population. Ten percent of supply for these systems comes from groundwater, the remainder from surface sources. Sixteen organizations collect or treat residential wastewater. Only 29% of the region's population is served. Population is projected to increase from 162,276 in 1970 to 179,197 in 1990. Population and water demands are projected for sub-regions. Environmental goals for water and sewerage services include encouraging adequate water and wastewater disposal services where feasible, using these services to control new development, and bringing waste discharges up to federal and state standards. Other objectives are insuring adequate water supplies for emergencies, insuring that stream water quality stays within prescribed state limits, protecting aquifer recharge areas by prohibiting incompatible development in high groundwater areas, and requiring secondary wastewater treatment. Criteria are set for feasibility of services related to population density, line sizes, water pressures, plant capacities, and minimum design periods. It is recommended that interconnections be made between several specific water and sewer systems. Other recommendations are made for subregions. (Stein-North Carolina)
W74-01469

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CONTROLS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
E. J. Kaiser, K. Elfers, S. Cohn, P. A. Reichert, and M. M. Hufschmidt.
Prepared for Environmental Protection Agency, Washington, D.C., June, 1973. 465 p, 16 fig, 2 tab, 1 append. EPA grant R801376.

Descriptors: *Planning, *Environmental effects, *Water management (Applied), Waste water, *Storm drainage, Watersheds (Basins), *Flood plains, *Urbanization, Land use, Estuaries, Regional development.
Identifiers: *Urban guidance systems, Water-land use interfaces, Land use planning, Urban waterfronts, Metropolitan planning.

This comprehensive study focuses on the current practices of local and metropolitan planning agencies in promoting environmental quality through urban planning and controls. The report looks at the beginnings of local environmental quality planning in the 1960's, presents the results of a questionnaire to local planning agencies on the state of current planning, and then focuses on more detailed examples of promising environmental quality planning approaches for the 1970's. These promising approaches of planning and urban guidance cover the substantive areas of land use planning, water resources management, urban design, and residuals management. The water resources management chapter emphasizes the interface between urban land use and water resources with particular attention to the problems and planning approaches related to the urbanization of watersheds, shorelands, floodplains, and estuarine areas. Emphasis is also placed on the improvement and redevelopment of urban-water interfaces in fully developed urban areas. These interfaces include wastewater management systems, storm water drainage, and urban waterfronts. A final section discusses the potential for integration of water resources systems on a metropolitan basis. Some of the key planning and guidance tools identified include development of guideline reports, policy statements, permit systems, floodplain zoning, effluents charges, utility extensions, tax policies, on-site storm water detention, and wastewater reclamation. (Eflers-North Carolina)
W74-01470

RELATING COMPREHENSIVE SEWER AND WATER PLANS TO THE COUNTY LAND USE PLAN. GOALS, POLICIES AND STANDARDS.
Chenango County Planning Board, Norwich, N.Y.

Available from the National Technical Information Service as PB-218 242 $3.00, in paper copy, $1.45 in microfiche. June, 1972. 20 p, 3 maps. HUD grant N.Y.P. 223.

Descriptors: *Planning, *Sewerage, *Water supply, Priorities, Project planning, Project post-evaluation, Land use, Water resource development, *New York.
Identifiers: *Land use/water, Sewage plan interface, Chenango County (NY).

This report divides into three sections. The first reviews HUD circular MPD-6415-2A, which outlines requirements for certification to meet water and sewer facilities grant program planning requirements. The second section describes how the county's comprehensive land use plan must relate to the sewer and water program, including priority assignments to be developed by the County Planning Board. Citizen participation is also requisite. The final section reviews the county's functional water and sewer plans with the three proposed land use plans, in terms of service area, level of anticipated development, and plan concept. The three land use plans range from minimum planning, direction, and control of the consequences of existing land use patterns to commitment to consolidating growth in the present population centers capable of handling development. The basic concept of both the water and sewage plans was consistent with each land use plan in recognizing that each urbanized area should develop as an independent unit providing its own services to supply its own needs. A regional or inter-community approach would not be feasible. (Hoffman-North Carolina)
W74-01473

COMPREHENSIVE WATER AND SEWER PLAN, RANDOLPH COUNTY, ILLINOIS.
Southwestern Illinois Metropolitan Area Planning Commission, Collinsville.

Available from the National Technical Information Service as PB-216 396, $6.00 in paper copy, $1.45 in microfiche. Report SWIL-MAPC-72-08, prepared for Randolph County Regional Planning Commission, December, 1972. 355 p, 16 fig, 35 plates, 100 tab, 97 ref, 3 append.

Descriptors: *Water supply development, *Sewerage, *Planning, *Illinois, Projections, Financing, Coordination, Water demand, Data collection, Treatment facilities, *Comprehensive planning, Waste water treatment.
Identifiers: *Randolph County (Ill), Water system expansion, Sewage treatment expansion.

The existing water and sewer systems in Randolph County, Illinois, are inventoried and analyzed with respect to their abilities to meet present and future projected demands. The upland areas, and in particular the northeast part of the county, lack adequate sources of water supply. Many of the municipal systems have low pressure areas that affect flow and quality. At least 18 sewage treatment facilities do not meet Illinois State Effluent Requirements. Furthermore, three facilities are operating at either full capacity or past design capacity levels. Local and countywide development policies, as reflected in comprehensive development plans, were used as a guide in developing recommendations. On the basis of yield capacity and the quality of the source being used to supply the individual household, central water systems were recommended for 13 communities. The county was divided into three study areas for delineation of improvement of water facilities. Details of the recommended plan for each area are included. Each sewer system is separately evaluated for needed short term and long range improvements. While a stated objective was to consolidate treatment facilities whenever possible, this was judged not cost-effective for short term planning. As short term improvements could meet existing and long range needs, the sewer facilities plan consists of maintaining individual sewer system and treatment facilities. Various methods of financing are discussed. (Hoffman-North Carolina)
W74-01474

STORM DRAINAGE AND FLOOD CONTROL FOR METROPOLITAN DENVER.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 04A.
W74-01475

REVIEW OF PLANNING FOR THE GRAND RIVER WATERSHED.

October 20, 1971. 107 p, 16 fig, 7 tab, 29 ref, 5 append. 229.

Descriptors: *Watershed management, *Water quality control, *Low-flow augmentation, *Computer models, Dams, Reservoirs, Waste water treatment, *Canada, Soil conservation, Groundwater, Flood control.
Identifiers: Computer simulation, Kitchener (Ont), Guelph (Ont), Brantford (Ont), *Grand River (Ont).

An investigation was made of issues related to watershed management for the 2,600-square mile Grand River watershed in Ontario, in which are located the cities of Kitchener, Guelph, and Brantford. Twenty-four recommendations for water management are discussed. The first priority: construction of a dam on the Speed River above Guelph, primarily for low-flow augmentation needed to maintain water quality, but also for flood control and recreation. Second priority: investigate methods to reduce loadings on the Speed River from the Guelph wastewater treatment plant. Third and fourth priorities: permit industrial wastes to be input to the Elmira treatment plant without adversely affecting the treatment process and construction of a low-flow augmentation dam above Elmira. Other recommendations call for other specific reservoirs for low-flow augmentation, employment of computer simulation to plan water management around water quality constraints, control of pollutants not now regulated by the Ontario Water Resources Commission and restricted growth upstream from certain cities. Conservation practices, intergovernmental cooperation, and several specific further studies are recommended. It is felt that Guleph should continue to obtain its water supply from groundwater for at least 30 years, thereby freeing surface water for use elsewhere. Appendices consider recreation facilities, flood control alternatives, and water supply alternatives in the basin. (Stein-North Carolina)
W74-01478

WATER MASTER PLAN. EUGENE-SPRINGFIELD URBANIZING AREA.
Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Oreg.
For primary bibliographic entry see Field 03D.
W74-01479

UTILITY PROVISIONS ANALYSIS FOR EAST CENTRAL FLORIDA.
Reynolds, Smith and Hills, Jacksonville, Fla.
For primary bibliographic entry see Field 06D.
W74-01480

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING REGION.
Aase (George) and Associates, Inc., Tallahassee, Fla.
For primary bibliographic entry see Field 06D.
W74-01481

REPORT ON LAUREL CREEK CHANNEL IMPROVEMENTS, WATERLOO AND BRIDGEPORT, ONTARIO.
Kilbom Engineering Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 04A.
W74-01482

FLOODLAND AND SHORELAND DEVELOPMENT GUIDE.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04A.
W74-01483

A GROWING COMMUNITY: 1973 UPDATE, (LEXINGTON, KENTUCKY).
Lexington and Fayette County Planning Commission, Lexington, Ky.

1973. 159 P, 37 FIG, 41 MAPS, 145 TAB.

Descriptors: *Comprehensive planning, *Water supply, *Sewage disposal, *Kentucky, River basin development, Drainage, Storm runoff, Septic tanks.
Identifiers: *Lexington (Ky), Kentucky River, Red River (Ky), Gorges.

A many-faceted comprehensive development plan describes present situations, identifies goals and/or trends, and projects future actions. The major surface water quality problem is pollution from sewage effluent discharges. Offenders include point and non-point sources, but there is no quantification of pollution contributions. Bacterial, chemical, and detergent pollution is found in all streams. Bacterial pollution characterizes 70% of groundwater samples. The Lexington area is provided with 62 MGD raw water in 1973 from the Kentucky River and Hickman Creek watersheds. The Kentucky River is judged capable of supplying a sufficient quantity of water until 1980, but the proposed Red River Dam and other sources may become necessary suppliers. Cause for delay in building of Red River Dam has been protests from environmentalists that Red River Gorge is a unique site. Water demand by type of customer is projected in 5-year increments to 1990. Seven storm drainage basins and their $22 million of improvement needs are discussed individually. A cost summary is also given. The natural drainage system of Lexington is complicated by the city's position on a divide with watersheds falling off in all directions; sewage disposal problems are thereby complicated by the need for many sewage treatment plants. Two municipal sewage treatment plants serve the area, along with eighteen smaller non-municipal plants. Since 1964, a minimum of 10 acres has been required for septic tank installation. Plans are detailed for expansion of sewers to presently unserviced areas. (Stein-North Carolina)
W74-01484

SKETCH DEVELOPMENT PLAN, CHAMBERS COUNTY, ALABAMA.
East Alabama Regional Planning and Development Commission, Anniston.

Final Report, June 1973. 111 p, 34 fig, 20 tab, 12 ref. HUD 701 Grant no. 1020.

Descriptors: *Planning, *Water supply, *Alabama, *Sewage districts, Water treatment, Water pollution, Water districts.
Identifiers: *Chattahoochee River (Ala), Lafayette (Ala), Lanett (Ala), Chambers County (Ala).

The sketch development plan is a compilation of data with analysis, some suggested goals, and some recommendations pertaining to the county's development, with the degree of detail varying for different problem areas. Chambers County, Alabama, is rural, but contains two urban centers, Lafayette and Lanett. Population is declining, but urbanization continues in the urban clusters, especially in the 'sprawling' Chattahoochee Valley area around Lanett. Water supplies for the county come primarily from groundwater although Lafayette draws its supply from a small lake and the Valley district from the Chattahoochee. There are 5 public water systems serving 70% of the population. Samples reveal a high number of contaminated wells in use in rural areas. Four sewer systems serve 37% of the county's population. All sewer collection systems presently dispose sewage raw into collector streams. Plants which will provide primary and secondary treatment are now under construction in all four systems. The remaining unsewered areas of Chambers County are said to be too sparsely populated to warrant public sewers, save for an area adjacent to Lanett. Each water, sewerage, and storm sewer system in the county is examined individually. An unusual provider of services is the East Alabama, Water, Sewer, and Fire Protection District, a public corporation created to serve the urbanized but unincorporated areas south of Lanett, but empowered by the State to expand into municipalities and other counties. Treated water supplies for the entire Chattahoochee Valley urban corridor are purchased from West Point Pepperell, Inc., a textile manufacturer. Other water-related plans for the county are given. (Stein-North Carolina)
W74-01485

VIRUS CONCENTRATION FROM SEWAGE,
Baylor Coll. of Medicine, Houston, Tex. Dept. of Virology and Epidemiology.
A. Homma, M. D. Sobsey, C. Wallis, and J. L. Melnick.
Water Research, Vol 7, No 7, p 945-950, July 1973. 1 fig, 5 tab, 7 ref.

Descriptors: *Separation techniques, *Filtration, *Sewage, *Adsorption, *Viruses, Filters, Waste water treatment.
Identifiers: Preconcentration, Sample preparation.

Optimal conditions for concentrating poliovirus from large volumes of raw sewage have been established. Solids 1 millimicron or larger, present in the raw sewage, were removed by textile clarifying filters without significant retention of virus. By acidification of the clarified sewage and addition of salts to enhance virus attachment to the adsorbent, virus in the sewage was concentrated on a fibre glass depth filter, with subsequent elution of virus into small volumes suitable for assay. An 80-95 percent efficiency of virus concentration was effected. (Little-Battelle)
W74-01533

BACTERIOLOGY OF ACTIVATED SLUDGE, IN PARTICULAR THE FILAMENTOUS BACTERIA,
Agricultural Univ., Wageningen (Netherlands). Lab. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01540

MICROFAUNA OF ACTIVATED SLUDGE. PART III. THE EFFECT OF PHYSICO-CHEMICAL FACTORS ON THE OCCURRENCE OF MICROFAUNA IN THE ANNUAL CYCLE,
Instytut Gospodarki Kommunalnej, Warsaw (Poland). Pracownia Hydrobiol.
For primary bibliographic entry see Field 05C.
W74-01542

BIODEGRADATION OF O-BENZYL--P-CHLOROPHENOL,
Monsanto Co., St. Louis, Mo.
For primary bibliographic entry see Field 05B.
W74-01552

THE ACTION OF MINERAL FERTILIZATION ON PASTURE HERBAGE, IRRIGATED WITH SEWAGE, (IN RUSSIAN),
Moskovskaya Selskokhozyaistvennaya Akademiya (USSR).
V. P. Spasov.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 1. p 25-26. 1972. Illus.
Identifiers: Calcium, *Fertilization, Herbage, Irrigated areas, *Minerals, Nitrogen, Pasture, Phosphorus, Potassium, *Sewage.

The effect of sewage upon pasturable herbage, increases of N, P1O5, K2O and CaO was investigated. As a control fields that were not irrigated and fields that were irrigated with river

water were investigated. Fertilization was always more effective in conjunction with sewate application.--Copyright 1973, Biological Abstracts, Inc.
W74-01559

COMPARATIVE EVALUATION OF THE EFFICACY OF OZONIZATION AND OTHER MEANS OF TREATING WATER CONTAIMINATED WITH OIL PRODUCTS (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I).
For primary bibliographic entry see Field 05F.
W74-01580

BARRIER ROLE OF WATER WORKS INSTALLATIONS IN RESPECT TO CHEMICAL CONTAMINATIONS CLASSIFIED ACCORDING TO ORGANOLEPTIC PROPERTIES OF HAZARDS, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
S. N. Cherkinskii, L. N. Gabrilevskaya, V. P. Laskina, and M. N. Rubleva.
Gig Sanit. Vol 37, No 5, p 12-15, 1972. (English Summary).
Identifiers: Barrier role, *Chemical contamination, *Organoleptic properties, Water works installations, *Waste water treatment.

Investigations show the protective capacity of physico-chemical processes of water treatment with respect to 30 kinds of chemical industrial contaminations. The results point to an extremely insignificant decontaminating effect of the ordinary water works installations for industrial chemical contaminations.--Copyright 1973, Biological Abstracts, Inc.
W74-01584

A BILL TO BE KNOWN AS THE 'RIVER BASIN WASTE TREATMENT AUTHORITY ACT OF 1973'.
For primary bibliographic entry see Field 06E.
W74-01614

THE ROLE OF MICRO-ORGANISMS IN WASTE TIP-LAGOON SYSTEMS PURIFYING COKE-OVEN EFFLUENTS,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Microbiology.
D. A. Stafford, and A. G. Callely.
Journal of Applied Bacteriology, Vol 36, No 1, p 77-87, March 1973. 6 fig, 3 tab, 12 ref.

Descriptors: *Aerobic bacteria, *Microbial degradation, *Lagoons, Liquid wastes, Microorganisms, *Phenols, Biodegradation, Waste water (Pollution), Waste water treatment, Water purification.
Identifiers: *Coke-oven effluents, Colliery waste tips, Orthophosphates, Substrate utilization, Fate of pollutants, Tip liquors, Thiocyanates, Coking industry, Monohydric phenols, Heterotrophic bacteria, Enrichment.

The population of aerobic bacteria present in the waters of a tip-lagoon system being used to purify a coke-oven effluent has been investigated. Though organisms capable of degrading phenol were detected, the total bacterial population was low, mainly due to a deficiency of orthophosphate and lack of aeration. Phenols can be removed from coke-oven effluents by allowing them to percolate through columns of material from colliery waste tips. Bacteria need not be present for this to occur though the presence of bacteria capable of degrading phenol was detected in the liquid coming from such columns. Only traces of thiocyanate are removed. If a biological filter can be developed, as on columns packed with gravel, better removal of phenols and thiocyanate occurs, but it is doubtful if bacteria play any significant role in the purification of coke-oven waste liquors percolating through tips of colliery waste. (Holoman-Battelle)
W74-01647

5E. Ultimate Disposal of Wastes

CATEGORIES OF RELATIVE FEASIBILITY FOR SEPTIC-TANK FILTER FIELDS IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01145

IMPROVED WASTE DISPOSAL UNIT,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 05D.
W74-01284

A COST-EFFECTIVENESS STUDY AND ANALYSIS OF MUNICIPAL REFUSE DISPOSAL SYSTEMS,
Arizona Univ., Tucson.
M. L. Popovich.
Department of Hydrology and Water Resources, Technical Report No. 20, Natural Resources Systems Series, Jun 1973. 70 p, 7 tab, 40 ref.

Descriptors: *Solid wastes, *Waste disposal, *Landfills, *Water pollution sources, *Cost analysis, Leaching, Recycling, Groundwater, Water quality, Waste dumps, *Arizona, Economic inpact, Social values, Burining.
Identifiers: *Tucson (Ariz).

A comparison of alternative systems of disposing efficiently and effectively of four to five pounds of solid waste per person per day in U.S. urban communities is undertaken by using standardized cost-effectiveness methodology. The economic criteria for studying this problem are often limited to cost or marketing measures; in contrast, use of a cost-effectiveness approach allows the inclusion of non-quantifiable measures of effectiveness such as public acceptance, politics, health risks, environmental considerations, and soil benefits. Data from a case study in Tucson, Arizona, are used to illustrate the problem. The specifically arid conditions of the example area are important in the analysis of such problems in other desert areas. Emphasis is placed on the effects of solid waste disposal in sanitary land fills on groundwater quality in arid regions, such as Tucson. Due to the shallow infiltration of surface water on the desert floor and the consumption of this water by desert plants, coupled with up to six feet of soil, the possibility of water infiltration into such fills seems small. (Muller-Arizona)
W74-01631

5F. Water Treatment and Quality Alteration

WATER. EXAMINATION. ASSESSMENT. CONDITIONING. CHEMISTRY. BACTERIOLOGY. BIOLOGY,
K. Hoell.
Walter de Gruyter: Berlin, West Germany; New York, N.Y., 1972. 389 p. Illus. $24.00.
Identifiers: Assessment, *Bacteriology, Biology, Chemistry, Conditioning, Examination, *Potable water, *Water analysis, *Water treatment, Pollutant identification.

Although this book, translated from the 5th German edition, is primarily devoted to drinking water, discussions on other closely related uses for water are included. The book is based on practical experience and is written for practical use, omitting theoretical discussions and chemical equations where possible. In Part 1 dealing with the chemistry of water, investigations of drinking water, general remarks about chemical examination of water, drinking water analysis, assessment of drinking water, major drinking water analysis of tap water, assessment of drinking water and service water for central water supply, examination and assessment of bath water, water for building purposes, surface water and waste-water and mineral water and medicinal water are discussed. In Part 2 bacteriology of drinking water, water and disease, inspection of the site, sampling, determination of the bacterial count, detection of various foreign organisms in the water and the membrane filter procedure are included. In the final part, biology of water, methods of biological water investigations and methods of combatting organisms in drinking water supply plants are considered. Many diagrams and tables are provided throughout. Each of the 3 sections ends with a related bibliography.--Copyright 1973, Biological Abstracts, Inc.
W74-01236

THE CHARACTERISTICS OF THE RAW WATERS OF HASDEO RIVER AND DHENGUR NALA AT KORBA (M. P.),
Fertilizer Corp. of India, Sindri. Planning and Development Div.
For primary bibliographic entry see Field 05A.
W74-01240

EPIDEMIOLOGICAL AND TOXICOLOGICAL ASPECTS OF NITRATES AND NITRITES IN THE ENVIRONMENT,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
For primary bibliographic entry see Field 05C.
W74-01386

DRINKING WATER,
J. Crossland, and V. Brodine.
Environment, Vol 15, No 3, p 11-19, April, 1973.

Descriptors: *Water supply, *Water quality standards, *Water pollution, Water quality, Viruses, Nitrates, Nitrites, Potable water, Chlorine, Salts, Oil, Soil microorganisms, *Potable water.
Identifiers: Toxic metals, Chlorinated hydrocarbons.

Chemicals and viruses present in drinking water in the U. S. which have either been proven or are suspected to be dangerous to humans are surveyed. A Bureau of Water Hygiene study in 1969 found that 41% of 969 drinking water systems failed to meet 1962 Public Health Service standards, while 36% of 2,595 water taps sampled contained at least one contaminant in amount exceeding drinking water standards, and 10% exceeded standards for total organic chemical compounds. There are 496 organic chemicals found or suspected to be contaminating water in various parts of the country. Nitrates, which may be converted to nitrites which react with hemoglobin in the red blood cells, causing disability to carry oxygen, were found in 19 of the 969 water systems sampled by the Public Health Service. Application of highway deicing salts contributes large amounts of chloride and sodium to public water supplies. There is speculation as to the effects of toxic metals, chlorinated hydrocarbons, oil, viruses, and soil microorganisms in water supplies. The adequacy of current Public Health Service bacteriological standards is questioned in light of several major disease outbreaks in recent years. The difficulty of assessing safety margins provided by present treatment methods when polluted sources are used is emphasized. It is concluded that current standards and treatment processes are inadequate to provide water pure enough for drinking and swimming when supplies receive domestic, agricultural, and industrial wastes. (Stein-North Carolina)
W74-01466

SHIGELLA SONNEI ISOLATED FROM WELL WATER,
Iowa Univ., Iowa City. State Hygienic Lab.
For primary bibliographic entry see Field 05A.
W74-01551

SENSITIVITY OF THREE SELECTED BACTERIAL SPECIES TO OZONE,
Brooke Army Medical Center, Fort Sam Houston, Tex. Health Care Research Div.
W. T. Broadwater, R. C. Hoehn, and P. H. King.
Applied Microbiology, Vol 26, No 3, p 391-393, September 1973. 2 fig, 15 ref.

Descriptors: *Ozone, Water pollution effects, *Lethal limit, Laboratory tests, *Bacteria, *E. coli, Bioassay, Disinfection, Water purification, Aerobic bacteria, Enteric bacteria, Coliforms, *Water treatment, Water quality, Bactericides.
Identifiers: *Sensitivity, Spores, Vegetative cells, Bacillus megaterium, Bacillus cereus, Bacterial physiology, Sample preparation.

The minimal lethal concentration of ozone in water was determined for three bacterial species: Escherichia coli, Bacillus cereus, and Bacillus megaterium. A contact period of 5 min was selected. The lethal threshold concentration for the cells of B. cereus was 0.12 mg/liter while that for E. coli and B. megaterium was 0.19 mg/liter. Low concentrations of ozone were ineffective when organic matter was present to interfere with the action of ozone on the bacterial cells. Also determined during the study was the sensitivity of spores of B. cereus and B. megaterium to ozone in water. The threshold concentration required to kill the spores of both species was 2.29 mg/liter. The cells and spores of these organisms exhibited the 'all-or-none' die-away phenomenon normally associated with ozone treatment. The results indicate that ozone, in relatively low concentrations, is an effective bactericide against both vegetative cells and spores of three bacterial species. In practical applications, ozone most probably would be applied at higher dosages (0.5-10 mg/liter) and for longer contact periods (2-10 min) because, as was shown in this research, organic matter present in the water will exert an ozone demand and prevent the full utilization of the applied dose as a disinfectant. (Holoman-Battelle)
W74-01553

EFFECT OF PARTIAL DEFLUORIDATION OF A WATER SUPPLY ON DENTAL FLUOROSIS: FINAL RESULTS IN BARTLETT, TEXAS, AFTER 17 YEARS,
National Inst. of Dental Research, Bethesda, Md.
H. S. Horowitz, and S. B. Heifetz.
Am J Public Health, Vol 62, No 6, p 767-769, 1972.
Identifiers: *Defluoridation plant, Dental, *Fluorosis, *Texas (Bartlett), Years, Potable water, *Water treatment.

In 1952, a defluoridation plant was installed in a small community in Texas to demonstrate an effective means of removing excess fluorides from drinking water. A final survey made in 1969 showed that the prevalence of fluorosis was reduced dramatically by partial defluoridation.--Copyright 1973, Biological Abstracts, Inc.
W74-01578

COMPARATIVE EVALUATION OF THE EFFICACY OF OZONIZATION AND OTHER MEANS OF TREATING WATER CONTAIMINATED WITH OIL PRODUCTS (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I).
S. N. Cherkinskii, and A. A. Korolev.
Gig Sanit, Vol 37, No 4, p 14-18, 1972, Illus, English summary.
Identifiers: Comparative, Contaminated water, *Oil wastes, *Ozonization, *Water treatment, Potable water, Oil pollution, *Waste water treatment.

The efficacy of ozonization and certain widely used methods of treatment of drinking water contaminated with oil products was studied. Ozonization is an effective means of improving the quality of such water. The possibility of attaining the hygienic effect when only ozone is used depends on the initial concentration of oil products in the water. Thus, in cases of heavy contamination of water with oil products, the ozone treatment must be preceded by other means of decontamination.--Copyright 1973, Biological Abstracts, Inc.
W74-01580

METABOLIC EFFECTS OF DRINKING BRACKISH WATER,
Central Negev Hospital, Beersheba (Israel).
For primary bibliographic entry see Field 05C.
W74-01632

5G. Water Quality Control

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA TEXTILE INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
Hal B. Pickle, and A. C. Rucks.
Available from the National Technical Information Service as PB-225 156/9, $4.50 in paper copy, $1.45 in microfiche. Bulletin 11, 1973. 145 p, 21 fig, 30 tab, 175 ref. OWRR C-3292 (No 3715) (1).

Descriptors: *Alabama, *Economic impact, *Industrial wastes, Marketing, *Pollution abatement, *Prices, Value, *Competitive prices, Competition, Cost analysis, Textiles.
Identifiers: *Textile industry.

In order to access the impact of water pollution abatement on competition and pricing in the Alabama textile industry, three questions were answered. (1) How much is water pollution abatement costing the textile industry. (2) How is the intermediate consumer affected by these costs. (3) How is the ultimate consumer affected by the cost of water pollution control. The cost of water pollution control for firms in the Alabama textile industry ranges from $64.40 per million gallons (MG) to $85.50 per MG. As a percent of total manufacturing costs, the cost of waste treatment ranges from 0.33 percent to 1.31 percent. Due to the competitive condition of the textile industry, all firms will absorb the cost of water pollution control. If a firm in the textile industry were to decide to pass on a cost increase to customers the firm could expect 30 percent of the customers to shift to either another domestic or a foreign supplier, at price increases of less than 3 percent. At price increase in excess of 3 percent, a firm could expect 85 percent of its customers to shift to either another domestic or a foreign supplier. There will be no price increase on textile products to ultimate or final consumer.
W74-01101

VORTEX CONCEPT FOR SEPARATING OIL FROM WATER,
United Aircraft Research Lab., East Hartford, Conn.
R. L. Stoeffler, and C. E. Jones.
Available from NTIS, Springfield, Va. 22151 as AD-758 320, $3.00 printed copy; $1.45 microfiche. Final Engineering Report No. L911354-8 to U.S. Coast Guard, January 1973. 77 p, 35 fig, 8 tab, 9 ref. DOT Contract CG-20253-A.

Descriptors: *Oily water, *Separation techniques, *Ships, Methodology, Vortices, Scaling, Flow separations, Testing procedures, Equipment, Centrifugal pumps, Evaluation.
Identifiers: *Vortex oil and water separator.

The vortex separator separates oil from an oil-water mixture on a continuous flow basis. This study was in three parts: (1) an experimental investigation of 10- and 50-gpm separators to determine performance throughout ranges of geometric and flow conditions, (2) experiments and analyses to determine a technique for scaling, and (3) an analytical evaluation of 100-, 1000-, and 10,000-gpm separator systems for shipboard operation. The tests with the two separators showed that for oil concentrations of the inlet oil-water mixture up to 5000 ppm, the concentration of oil in the clean water exhaust was 30 ppm or less; for oil concentrations of the mixture up to 10,000 ppm, the concentration of oil in the exhaust was 60 ppm or less. The scaling of vortex separators indicated that separators having good performance can be designed for flows up to about 200 gpm. Parallel operation with two or more separators will be required for flow rates greater than 200 gpm. The analytical evaluation of separators for shipboard operation indicated that 100- and 1000-gpm systems appear feasible. For larger systems, the space and power requirements may be excessive. The results of a study of a 250,000 dwt tanker indicate that an 800- or 900-gpm system would provide sufficient capacity for ballast water cleaning. (Woodard-USGS)
W74-01148

MOBILE OXYGEN DISPERSION CRAFT,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
W. Whipple, Jr.
Water Resources Bulletin, American Water Resources Association, Vol 9, No 4, p 639-646. August 1973. 3 fig, 1 tab, 4 ref.

Descriptors: *Aeration, *Oxygenation, *Water quality, Economic analysis, Waterways, Dispersion, Water pollution control, Pollution abatement, Bubbles.
Identifiers: *Instream aeration, *Induced oxygenation.

Water pollution control by effluent treatment becomes increasingly expensive as the degree of treatment is increased. As has previously been demonstrated, instream aeration provides an economical alternative for the higher degrees of treatment. For large, deep, navigable rivers, another alternative may be still more economical, namely, mobile oxygenating craft, using fine bubble diffusers. The propellors in the craft plus its mobility would give important advantages in dispersing the oxygenated water; and one craft could replace a multiplicity of static aeration sites.
W74-01232

NITRATES IN SOIL AND GROUND WATER BENEATH IRRIGATED AND FERTILIZED CROPS,
Agricultural Research Service, Fresno, Calif. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 03F.
W74-01245

SWEDISH LAKE RESTORATION PROGRAM GETS RESULTS,
Lund Univ. (Sweden). Limnological Inst.
S. Bjork.
Ambio, Vol 1, No 5, p 153-165, 1972, Illus.
Identifiers: *Lake restoration, Tunis, Tunisia, *Sweden, *Aeration.

Lake restoration projects are being carried out in Sweden in order to obtain methods for restoring irreversibly damaged lakes, to train limnologists and to contribute knowledge to theoretical ecology. Lake Trummen was a shallow, over-exploited recipient, and the black sediment from the lake's receiver period was pumped up into settling ponds on land. In Jarla Lake, a deep recipient, the O2 deficiency in the hypolimnion was remedied by aeration without disturbing the thermal stratification. Hornborga Lake became overgrown with

macrophytes after the water level was lowered. Methods for directing the development from emergent to underwater vegetation have been worked out in order to reestablish the environmental conditions of a waterfowl lake. Methods and experience gained in the Swedish projects are being applied in the planning of the restoration of the Lake of Tunis in Tunisia.--Copyright 1973, Biological Abstracts, Inc.
W74-01262

OCEAN UTILIZATION AND COASTAL ZONE DEVELOPMENT.
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 02L.
W74-01281

OXNARD BASIN EXPERIMENTAL EXTRACTION-TYPE BARRIER,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 08B.
W74-01289

EFFECTS OF PARAQUAT ON INVERTEBRATES IN A CANTEBURY STREAM, NEW ZEALAND,
Ministry of Agriculture and Fisheries, Wellington (New Zealand). Fisheries Research Div.
For primary bibliographic entry see Field 05C.
W74-01298

CHARACTERIZATION AND TREATABILITY OF POMACE STILLAGE,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05A.
W74-01325

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR FACILITATORS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01367

INVENTORY AND EVALUATION OF INFORMATION ON DELAWARE BAY, VOLUME 2.
Natural and Historic Resource Associates, Philadelphia, Pa.
For primary bibliographic entry see Field 06E.
W74-01369

ENGINEER'S REPORT FOR SOUTH VALLEY WATER SYSTEM.
Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.
For primary bibliographic entry see Field 06B.
W74-01382

LEAVES AS SOURCE OF PHOSPHORUS,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05B.
W74-01407

THE SHIPOWNER AND OIL POLLUTION LIABILITY,
P. D. Lowry.
McGill Law Journal, Vol 18, No 4, p 577-591, December 1972. 76 ref.

Descriptors: *Legislation, *Canada, *Water pollution, Oceans, Ships, Water pollution sources, Water law, Oil wastes, Oily water, Law enforcement, Governments, Water quality standards, International law, Foreign waters.

A comprehensive analysis is presented of the shipowner's civil and criminal liability for oil pollution in Canadian waters. This liability was, on September 21, 1971, substantially increased by the promulgation of extensive amendments to the Canada Shipping Act. The shipowner's responsibility to the government for the costs of remedying the effects of an oil spill will become a matter of strict liability while previously it was limited to little more than a moral obligation. In like manner, damages suffered by individuals and private concerns will become recoverable from the shipowner or his insurers by a statutory right of action with provision for guaranteeing payment where previously such claimants had only common law remedies on which to rely. The maximum penalty which may be imposed for the wrongful discharge of oil from a ship has been increased to $100,000. The legislative background of the Act is reviewed, and the weight and practical effect of the liability for marine pollution are discussed. (Mockler-Florida)
W74-01447

VIRGINIA NATURAL RESOURCES LAW AND THE NEW VIRGINIA WETLANDS ACT,
For primary bibliographic entry see Field 02L.
W74-01448

MARINE POLLUTION: A CRITIQUE OF PRESENT AND PROPOSED INTERNATIONAL AGREEMENTS AND INSTITUTIONS--A SUGGESTED GLOBAL OCEANS' ENVIRONMENTAL REGIME,
San Francisco Univ., Calif.
L. R. Lanctot.
Hastings Law Journal, Vol 24, No 1, p 67-109, November 1972. 175 ref.

Descriptors: *Oceans, *Legal aspects, *Sea water, Water law, Water pollution control, Water resources development, International commissions, International law, International waters, Jurisdiction, Governments, Law of the sea, Foreign waters, Treaties.
Identifiers: *Territorial waters.

Because the vast resources of the oceans were inaccessible in the past, international law does not provide any certain rules governing the ownership and development of marine resources which lie beyond the limits of national jurisdiction. In response to this legal uncertainty and in the face of accelerating technology, the United Nations General Assembly has called a General Conference on the Law of the Sea to formulate international conventions governing the development of the seabed and ocean floor. In preparation for the conference many countries have submitted proposed international seabed regimes for consideration. The existing law of the sea and the proposed seabed regimes are examined to determine to what extent they will ensure and enhance the environmental quality of the oceans and protect the marine environment from further deterioration. Features for a global oceans' environmental regime are suggested. (Mockler-Florida)
W74-01449

THE INTERSTATE WATER POLLUTION COMPACT--PAPER TIGER OR EFFECTIVE REGULATORY DEVICE,
Oak Ridge National Lab., Tenn.
J. W. Curlin.
Ecology Law Quarterly, Vol 2, p 333-356, Spring 1972. 135 ref, append.

Descriptors: *Interstate compacts, *Water pollution control, Governments, Water policy, Water resources development, Interstate rivers, Water law, Governmental interrelations, Water quality standards, Federal governments.

It is the express intention of Congress that the states are to bear the responsibility for the control of pollution of both intrastate and interstate waters. Federal intervention is to be restricted to the following specific instances of danger to public health and welfare: When the states have refused to accept this responsibility, when requested by the downstream state receiving the pollutants, when requested by the governor of the state in which the discharge originates, or when substantial economic injury to shellfish has occurred in a non-discharge state. As a result, water quality standards for interstate waters can be violated so long as the discharge does not endanger human health or welfare and does not cause significant damage to the marketability of the shellfish. The act lacks substance since abatement of sub-hazardous violations depends upon voluntary action by the state wherein the discharge occurs. (Mockler-Florida)
W74-01450

WATER POLLUTION IN LOUISIANA: AN ATTEMPT AT CONTROL,
I. R. Silverstein.
Loyola Law Review, Vol 18, No 3, p 734-745, 1971-1972. 61 ref.

Descriptors: *Louisiana, *Legislation, *Water pollution, *Water quality, Water quality standards, Pollutants, Legal aspects, Common law, Constitutional law, Judicial decisions, Law enforcement, Penalties (Legal), Economics, Competing uses.

A bill introduced into the Louisiana state legislature is analyzed as to its chances for success as a curb on the pollution of state waters. Existing federal legislation is reviewed. Because of the federal government's refusal to enforce legislation regarding water pollution, the onus of enforcement is in the individual states. Furthermore, because of the vast extent of water resources in Louisiana, and the rapid industrialization now taking place there, water pollution in the state of Louisiana poses an especially dangerous threat unless controls are instituted immediately. The legislature restricted the prohibition of the proposed bill to discharges into public bodies of water. If the proposed bill had not been so restricted, the chances of its success in halting the discharge of pollution into the waters of the state would have been good. Even so, some merit is seen in the bill as the legislature has extended its authority over water pollution, and in doing so has hopefully abated the premature death that would otherwise be suffered by Louisiana's bayous, streams, and marshlands. (Reed-Florida)
W74-01451

IN RE SPRING VALLEY DEVELOPMENT (CHALLENGE TO ORDER OF ENVIRONMENTAL IMPROVEMENT COMMISSION DENYING DEVELOPMENT ALONG SIDE OF POND).
For primary bibliographic entry see Field 06E.
W74-01454

SIERRA CLUB V. MASON (ACTION TO ENJOIN DREDGING OF NEW HAVEN HARBOR).
For primary bibliographic entry see Field 06E.
W74-01456

A BILL TO ESTABLISH THE CANAVERAL NATIONAL SEASHORE IN THE STATE OF FLORIDA.
For primary bibliographic entry see Field 06E.
W74-01457

FLORIDA POLLUTION STATUTE INFRINGES UPON EXCLUSIVE FEDERAL MARITIME LEGISLATIVE DOMAIN, THE AMERICAN WATERWAYS OPERATORS, INC. V. ASKEW, 335 F. SUPP. 1241 (M.D. FLA).
Journal of Maritime Law and Commerce, Vol 4, No 1, p 163-168, October 1972.

Descriptors: *Statutes, *Judicial decisions, *Pollution, *Jurisdiction, Oil wastes, Vessels, Port authorities, Harbors, Legal review, Governmental interrelations, Competing uses, Water pollution control.

This case note presents a comprehensive discussion of the state of Florida's pollution statute as an infringement upon exclusive federal maritime legislative domain. In the subject case, a variety of plaintiffs challenged the statute's validity on several federal constitutional grounds. They contended that Florida sought to legislate substantive maritime law which, under the United States Constitution, is exclusively within the federal domain; that the Act violated the Commerce Clause, since it attempted to regulate interstate and foreign commerce; and, that certain parts of the Act violated the due process and equal protection provisions of the Fourteenth Amendment. The three judge federal court agreed with the first contention and declared the Florida statute null and void and without effect because it violated Article III, Section 2, Clause 3 of the U.S. Constitution. The court rejected the argument that the Florida Act was valid under the provision of the Federal Water Quality Improvement Act on the ground that Congress may not confer on the states authority to legislate within the admirality jurisdiction. (Mockler-Florida)
W74-01460

THE PORTER-COLOGNE WATER QUALITY CONTROL ACT, AND RELATED WATER CODE SECTIONS (CONTAINING THE 1971 AMENDMENTS).
California State Water Resources Control Board, Sacramento.

March 1972. 55p.

Descriptors: *California, *Legislation, *Water quality control, *Water resources development, Administration, Comprehensive planning, Conservation, Local governments, Regional development, Water policy, Water resources, Wells, Well regulation, Waste water disposal.

The California state policy on water quality control consists of water quality principles and guidelines for long-range resource planning, water quality objectives for the planning of water resource development projects, and such other principles and guidelines deemed essential by the State Water Resources Board. The function and duties of the Board, as well as the means for establishing policies are stated in the Porter-Colgne Water Quality Control Act. A regional board is established for each of the nine regions into which the state is divided, and the duties of this board are specified. Each regional board is to formulate and adopt water quality control plans in conformity to the state policy. The regional board may prescribe requirements as to the nature of any proposed discharge, taking into consideration the conditions existing from time to time in the disposal area. The Act provides for the enforcement and implementation of regional board orders. The state board and the judiciary may review such orders. The state board is authorized to provide loans for the development of water reclamation facilities. The Act provides for the regulation of water and cathodic wells. The transportation and disposal of wastes is also covered by the Act. (Reed-Florida)
W74-01461

CITY OF MONMOUTH V. ENVIRONMENTAL PROTECTION AGENCY (EPA SUED THE CITY TO PROHIBIT THE CITY FROM CONTINUING TO MAINTAIN A SEWAGE LAGOON SYSTEM WHICH WAS EMITTING NOXIOUS ODORS).
For primary bibliographic entry see Field 06E.
W74-01462

APPLICATION OF MATHEMATICAL MODELLING TO WATER QUALITY MANAGEMENT,
EASAMS, Camberley (England).
For primary bibliographic entry see Field 05B.
W74-01486

PHYSICAL SYSTEM MODELLING AS A TOOL IN WATER RESOURCE PLANNING,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 02A.
W74-01487

SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF ANP-2 COMPOUND IN WATER BODIES, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
V. I. Vorob'ev.
Gig Sanit. Vol 37, No 2, p 14-17. 1972, Illus, (English summary).
Identifiers: *Amines, *ANP-2 compound, Cation collectors, *Maximum permissible concentration, Rabbit, Rat, Substantiation, Water purification, Animals.

ANP-2 (a cation collector in the amine series) at a concentration of 0.45 mg/1, produced no changes in the processes of purification of water bodies and was ineffective for warm-blooded animals (mice, rats and rabbits).--Copyright 1973, Biological Abstracts, Inc.
W74-01581

PROTECTIVE FUNCTION OF THE FOREST IN AREAS OF WATERWORK RESERVOIRS, (IN CZECH),
Vysoka Skola Zemedelska, Brno (Czechoslovakia). Fakulta Lesnicka.
For primary bibliographic entry see Field 04A.
W74-01582

NITRATE REDUCTION IN SOILS: EFFECT OF SOIL MOISTURE TENSION,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 02G.
W74-01583

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN. MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District. Mobile, Ala.
For primary bibliographic entry see Field 04A.
W74-01610

EARLY THOUGHTS ON PROSECUTING POLLUTERS,
Santa Clara, Univ., Calif.
K. A. Manaster.
Ecology Law Quarterly, Vol 2, No 3, p 471-492, Summer 1972. 55 ref.

Descriptors: *Illinois, *Water pollution control, *Legal aspects, Law enforcement, Judicial decisions, Governments, Water quality standards, Water law, Water policy, Administration, Water resources development, Legislation.

Reflections are presented of a former prosecutor who represented the people of Illinois in the beginning stages of enforcing the new environmental laws of that state through government-sponsored litigation. General principles and policies involved and the concerns that prosecutors should bear in mind are discussed. The article is intended as a partial how-to-do-it manual for a pollution prosecution office at any level of government. The emphasis is upon the principal tools identified in the state of Illinois thus far for use by government lawyers in combating polluting. No systematic philosophy or structural scheme is offered. The attorney must depend primarily upon the statutory and judicial statements in his own jurisdiction. (Mockler-Florida)
W74-01613

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
Conference Report No 92-1465 -- U.S. House of Representatives, 92d Cong, 2d Sess, September 28, 1972. 156 p, 3 tab.

Descriptors: *Legislation, *Water pollution control, *Water quality standards, *United States, Legal aspects, Comprehensive planning, Jurisdiction, Economics, Water policy, Water law, Permits, Water utilization, Research and development.

The objectives of the amendments are to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The amendments contain sections concerning research and related programs, comprehensive plans for water pollution control, interstate cooperation and uniform laws, grants for research and development, pollution control in the Great Lakes, grants for construction of treatment works, standards and enforcement, permits and licenses. In addition to the full text of the 1972 amendments, the document contains a joint House-Senate Conference Report. The Senate bill, House amendment, and the substitute measure proposed by the conference are included. While many of the amendments remain substantially the same, others were changed to a considerable extent by the conference committee. This is especially evident in title v, which contains the general provisions dealing with emergency powers, citizen suits, employee protection, and administrative procedure and judicial review. (Mockler-Florida)
W74-01615

DESIGNATING A SEGMENT OF THE ST. CROIX AS PART OF WILD AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 06E.
W74-01619

THE MANAGEMENT OF BAY AND ESTUARINE SYSTEMS IN THE TEXAS COASTAL ZONE, PHASE II.
Texas Univ., Austin. Div. of Natural Resources and the Environment.

Prepared for Office of the Governor, State of Texas, March 1973. 105 p, 5 fig, 5 tab, 160 ref, 2 append.

Descriptors: *Estuarine environment, *Texas, *Bays, *Coastal areas, Bodies of water, Oceans, Coastal engineering, Economics, Environmental effects, Resources management, Water quality control, Comprehensive planning.
Identifiers: *Coastal zone management.

The major emphasis is on those activities of man that may detrimentally affect coastal environmental units and resources. Hypothetical examples are given to indicate the economic and social consequences arising from the implementation of management tools to lessen detrimental environmental impact. The conclusions outlined present positive steps needed to develop an effective Texas coastal management program. Many policy decisions which will affect coastal zone activities must be made within the near future with inadequate quantitative, economic, social, and environmental criteria. Each coastal environmental unit was evaluated in terms of its natural capability to sustain human use that affects its physical, hydrological, geological, chemical, and biological properties, and is grouped in an appropriate resource capability class. (Mockler-Florida)
W74-01620

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-01621

A COST-EFFECTIVENESS STUDY AND ANALYSIS OF MUNICIPAL REFUSE DISPOSAL SYSTEMS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 05E.
W74-01631

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

SIMULATING THE BEHAVIOR OF A MULTI-UNIT, MULTI-PURPOSE WATER-RESOURCE SYSTEM,
Harvard Univ., Cambridge, Mass.
M. M. Hufschmidt.
In: Symposium on Simulation Models: Methodology and Applications to the Behavioral Sciences, South-Western, Cincinnati, Ohio, 1963. A. C. Hoggatt and F. E. Balderston, editors. p 203-220, (1963) 2 fig, 1 tab.

Descriptors: *Water resources, *Methodology, *Simulation analysis, *Idaho, Cost-benefit analysis.
Identifiers: *Clearwater River (Idaho), Harvard Water Resources Program.

Results are summarized of simulation studies, under the Harvard Water Program, of a model river basin system consisting of 4 reservoirs, 2 hydro-power plants, an irrigation distribution system and a flood damage center, based on the Clearwater River Basin in Idaho. Components of the simulation problem included 12 decision variables, and functions for capital and annual operation, maintenance and replacement cost, benefits and losses related to the system units. Objective of the simulation was the maximization of the present value of the 50-year stream of gross annual irrigation, energy and flood control benefits less annual operation, maintenance and replacement costs, discounted at a selected interest rate, less capital costs. The constraints, operating procedure, and manner of determining the optimal system design, by examining the net-benefit response surface, are discussed in detail, as is the overall solution strategy. The most striking feature of the net-benefit response surface of the simulation was its complexity. Either random or uniform grid sampling may be used early in the analysis to indicate the general configuration of the response surface and to provide starting points for a more detailed examination of parts of the surface with high net benefits. Prior to this, major system variables should be identified, and discontinuities and constraints spotted. Once the general region (s) of high net benefits have been identified, systematic sampling should be used to find the peak (s). Changes and extensions of the model are suggested based on its use in the study. (Edwards-North Carolina)
W74-01468

APPLICATION OF MATHEMATICAL MODELLING TO WATER QUALITY MANAGEMENT,
EASAMS, Camberley (England).
For primary bibliographic entry see Field 05B.
W74-01486

PHYSICAL SYSTEM MODELLING AS A TOOL IN WATER RESOURCE PLANNING,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 02A.
W74-01487

A HYBRID MODEL FOR IRRIGATION PLANNING USING CHANCE CONSTRAINED PROGRAMMING AND HYDROLOGIC SIMULATION,
Norwegian Inst. of Urban and Regional Research, Oslo.
For primary bibliographic entry see Field 04B.
W74-01488

ON THE OPTIMAL OPERATION OF GROUNDWATER BASINS: A CALCULUS OF VARIATIONS APPROACH,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 04B.
W74-01489

A LINEAR PROGRAMMING APPROACH TO FLOODPLAIN LAND USE PLANNING IN URBAN AREAS,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 03D.
W74-01490

ECONOMICS OF RESOURCE USE ON SAMPLE FARMS OF CENTRAL GUJARAT,
Indian Inst. of Management, Ahmedabad.
For primary bibliographic entry see Field 03F.
W74-01491

6B. Evaluation Process

REPORT OF ATTITUDES AND OPINIONS OF RECREATIONISTS TOWARDS WILD AND SCENIC RIVERS: A CASE STUDY OF THE ST. JOE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
K. Christophersen.
Available from the National Technical Information Service as PB-225 166/8, $3.75 in paper copy, $1.45 in microfiche. Scenic Rivers Study Report No. 9, October 1973. 66 p, 1 fig, 21 tab. OWRR C-3342 (No 3718) (3).

Descriptors: *Attitudes, *Idaho, *Wild rivers, River basin development, Wild rivers act, *Recreation.
Identifiers: *National Wild and Scenic Rivers System, *St. Joe River (Idaho).

Information was obtained from recreationists interviewed along the St. Joe River, regarding their attitudes and opinions of the proposed inclusion of the river in the National Wild and Scenic Rivers System. A sample of 350 randomly selected recreationists were interviewed. They were stratified into resident and non-resident categories for analytical purposes. Results of the survey revealed that large majorities of both resident and non-resident respondents were strongly or mildly in favor of including the entire river in the Wild and Scenic Rivers System. Their inclusion preferences were largely consistent with responses indicating a general desire to leave the area essentially as it is with little or no further development. In ranking recreational participation activities and other recreational features, the 'scenic beauty' category received the most 'excellent' votes. Few respondents gave any of the categories a 'poor' rating. The majority of resident and non-resident recreationists indicated a willingness to pay entrance fees if the inclusion of the river in the National Wild and Scenic Rivers System necessitated the imposition of user charges.
W74-01102

SURFACE-WATER RESOURCES OF THE USSR AND THEIR CHANGE RESULTING FROM HUMAN ECONOMIC ACTIVITY (RESURSY POVERKHNOSTNYKH VOD SSSR I IKH IZMENENIYE POD VLIYANIYEM KHOZYAYSTVENNOY DEYATEL'NOSTI),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 04A.
W74-01133

ENGINEER'S REPORT FOR SOUTH VALLEY WATER SYSTEM.
Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.

Available from NTIS, Springfield, Va 22151 as COM 73-10354 Price $3.00 printed copy; $1.45 microfiche. Engineers Contract Report, Prepared for Four Corners Regional Commission and Bernallillo County Board at County Commissioners, March 1972. 71 p, 5 map, 25 tab.

Descriptors: *Water pollution control, *Urbanization, *Urban hydrology, *Water supply, *New Mexico, Hydrologic data, Water analysis, Reviews, Evaluation, Water pollution sources, Septic tanks, Planning, Hydraulic structures, Costs, Economics, Social aspects, Water supply, Projections, Water demand.
Identifiers: *Bernalillo County (N Mex), Water system plans.

The purpose is twofold: (1) to present a comprehensive Water System Master Plan for the South Valley area of Bernalillo County, New Mexico, together with the data and analyses from which that plan was derived; and (2) to define a portion of the system which is economically feasible to construct at this time, together with the data and analyses from which that definition was determined. The growing problem of domestic water supply for the South Valley area has been recognized for some years, particularly by those public health agencies concerned with contamination of water supplies. The potential for bacterial contamination of the shallow groundwater is increasing as urbanization progresses. This has led to more stringent regulations governing well construction and the location and design of septic tanks. Based on the analyses it was deemed feasible to construct a water system which is an expansion of the existing city of Albuquerque system to serve that area of the southwest valley north of Rio Bravo Blvd. and south of the existing city limits. The system would also serve the existing Adobe Acres area south of Rio Bravo on Isleta Blvd. (Woodard-USGS)
W74-01382

PROSPECTS FOR THE USE AND CONSERVATION OF WATER RESOURCES IN THE USSR (PERSPEKTIVY ISPOL'ZOVANIYA I OKHRANY VODNYKH RESURSOV SSSR),
Moscow State Univ. (USSR). Chair of Hydrology.
V. D. Bykov, and G. P. Kalinin.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 5, p 3-7, September-October 1971. 1 tab.

Descriptors: Water resources, *Water utilization, *Water conservation, *Water resources development, *Planning, Water requirements, Water supply, Water demand, Runoff, Regulation.
Identifiers: *USSR.

Water resources of the USSR and their areal distribution are examined, and measures to regulate water use in the USSR in 1971-75 are described. Distribution of annual runoff by Union Republics and Economic Regions is tabulated, and problems in water-resources planning and development are discussed. (Josefson-USGS)
W74-01387

SIMULATION OF WATER RECREATION USERS' DECISIONS,
Kansas Univ., Lawrence. School of Business.
For primary bibliographic entry see Field 06D.
W74-01464

AND NOT A DROP TO DRINK: WATER RESOURCES PLANNING AND ADMINISTRATION,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 06E.
W74-01465

THE ROLE OF UNIVERSITIES IN WATER RESOURCES EDUCATION: THE SOCIAL SCIENCES,
North Carolina Univ., Chapel Hill.
M. M. Hufschmidt.
Water Resources Research, Vol 3, No 1, p 3-9, First Quarter 1967.

Descriptors: *Water resources, *Water management, Economics, Education.
Identifiers: *Social sciences, *Interdisciplinary approach, *Multidisciplinary.

The specialist education is examined of graduates who will be involved in the water resources field with respect to the future role of the social sciences. Education for water resources is an area of specialization which imposes rigorous constraints on education possibilities. Participation of university social science departments in such education is comparatively small. This involvement is reviewed, particularly with reference to economics, law, geography, political science and public administration. Unexploited opportunities in the application of the insights and methods of these fields exist, including multidisciplinary involvement through water resources topics for theses, service courses in social sciences for natural science and engineering students, and social science participation in seminars oriented toward water resources. A more complex form of organizing such involvement would be the studies program approach, consisting of a group of courses from numerous disciplines with a common theme or focus. An alternative would entail the long-term interdisciplinary collaboration of social and natural scientists and engineers in a integrated series of graduate courses and research seminars. These would deal with water resources problems, issues, and policies. Relevant areas and course topics within the social sciences are proposed. (Edwards-North Carolina)
W74-01467

SIMULATING THE BEHAVIOR OF A MULTI-UNIT, MULTI-PURPOSE WATER-RESOURCE SYSTEM,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 06A.
W74-01468

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM.
LBC and W Associates, Columbia, S.C.
For primary bibliographic entry see Field 05D.
W74-01469

RIVER BASIN PLANNING IN THE UNITED STATES,
Office of the Chief of Engineers (Army), Washington, D.C. Civil Works Planning Div.
E. W. Weber, and M. M. Hufschmidt.
In: Natural Resources: Energy, Water and River Basin Development; U. S. Papers Prepared for the UN Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas. February, 1963. Geneva, Switzerland. Vol 1, p 299-312, (1963) 26 ref.

Descriptors: *Water resources, *Planning, *Methodology, Benefit-cost analysis, History, *River basin development, United States.
Identifiers: *Developing nations.

The basic concept of integrated river-basin planning and an idealized methodology for such planning, the U. S. experience in planning during the past 30 years, and some important implications for the developing areas of the world are presented. Methodologically, river basin planning consists of: (a) setting broad objectives for development, (b) establishing criteria for formulation of specific plans, (c) formulating the optimal river-basin plan and development schedule and (d) reviewing proposed river basin plan or alternatives. Step C breaks down into: (1) identifiying and measuring the physical, economic, social problems, and requirements of the region; (2) identifying and measuring various opportunities for control and development of water and related land resources; and (3) formulating an optimal water development plan, including a development schedule. Benefit-cost analysis has been highly developed for these purposes. The U. S. experience is reviewed. Some conclusions are: (a) goals and objectives for river basin development should be clearly stated by top policy-makers at the outset of planning; (b) regional or local projections of economic activity or targets for economic development should be derived from established national ones; (c) successful planning hinges on the manner in which the task is set up; (d) benefit-cost analysis is useful in formulating and evaluating economically optimal plans; (e) river basin development planning should be considered in the context of total investment planning; (f) coordinating arrangements with other government units will be needed; (g) a broad, interdisciplinary-team approach is essential; and (h) programs for systematic and sustained collection and analysis of basic data are essential. (Edwards-North Carolina)
W74-01472

RELATING COMPREHENSIVE SEWER AND WATER PLANS TO THE COUNTY LAND USE PLAN. GOALS, POLICIES AND STANDARDS.
Chenango County Planning Board, Norwich, N.Y.
For primary bibliographic entry see Field 05D.
W74-01473

COMPREHENSIVE WATER AND SEWER PLAN, RANDOLPH COUNTY, ILLINOIS.
Southwestern Illinois Metropolitan Area Planning Commission, Collinsville.
For primary bibliographic entry see Field 05D.
W74-01474

FLOODLAND AND SHORELAND DEVELOPMENT GUIDE.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04A.
W74-01483

A GROWING COMMUNITY: 1973 UPDATE, (LEXINGTON, KENTUCKY).
Lexington and Fayette County Planning Commission, Lexington, Ky.
For primary bibliographic entry see Field 05D.
W74-01484

SKETCH DEVELOPMENT PLAN, CHAMBERS COUNTY, ALABAMA.
East Alabama Regional Planning and Development Commission, Anniston.
For primary bibliographic entry see Field 05D.
W74-01485

ECONOMICS OF RESOURCE USE ON SAMPLE FARMS OF CENTRAL GUJARAT,
Indian Inst. of Management, Ahmedabad.
For primary bibliographic entry see Field 03F.
W74-01491

FISHERIES AND FISH CULTURE IN ISRAEL IN 1971,
Laboratory for Research Fis. Dis., Nir David (Israel).
S. Sarig.
Bamidgeh, Vol 24, No 3, p 55-75, 1972, Illus.
Identifiers: *Cultures, Fish catch, *Fisheries, *Israel.

The total fish catch for 1971 showed a steady increase over that of 1970 and 1969, but the per capita consumption remained almost the same, at 10.1 kg. Statistics are given for the various sources of fish: imports, Lake Kinereth fishery, pond culture, etc. Increases or decreases of the catch of various fish species are given.--Copyright 1973, Biological Abstracts, Inc.
W74-01570

REGIONAL WATER RESOURCES STUDIES -- A SPANISH EXPERIENCE,
Garaghty and Miller, Port Washington, N.Y.
For primary bibliographic entry see Field 04B.
W74-01622

IMPACT OF IRRIGATION INVESTMENTS ON REGIONAL AND URBAN DEVELOPMENT,
Resources for the Future, Inc., Washington, D.C.
P. R. Crosson.
Paper presented at Internation Symposium on Water Resources Planning, Mexico City, December 1972. 63 p, 1 fig, 4 tab, 44 ref.

Descriptors: *Irrigation design, *Economic impact, *Urbanization, *Regional economics, *Irrigation programs, Management, Investment, Return (Monetary), Economics, Community development, Land use, *Mexico.
Identifiers: *Sonora (Mexico).

Planning of irrigation projects usually stops with the calculation of direct benefits and costs, and the ranking of projects according to cost-benefit ratios. Irrigation investments, however, may have repercussions of major importance that go far beyond the direct increase in agricultural production resulting from them. By improving the productivity of resources employed in agriculture, irrigation investments can trigger fundamental changes in the economic structure of the region in which they are placed. The increase in agricultural productivity improves the region's competitive position in national and international markets, thereby attracting new resources into the region's agricultural sector to take advantage of expanding economic opportunities. The increased quantity and productivity of agricultural resources in turn generates rising demands for urban supplied goods and services, thus stimulating urban growth in the region. Investment in irrigation thus can be viewed as an instrument of regional and urban development policy. The theoretical basis for this argument is developed and applied to the analysis of an arid location in Sonora, Mexico. (Muller-Arizona)
W74-01625

EDUCATIONAL PROGRAMS FOR LAND AND WATER RESOURCES DEVELOPMENT AND MANAGEMENT,
Arizona Univ., Tucson.
D. D. Evans.
Paper presented at International Symposium of Water Resources Planning, Mexico City, December 1972, 18 p.

Descriptors: *Schools (Education), *Training, *Education, Professional personnel, Colleges, *Universities, Technology, Information exchange, Social participation, Scientific personnel, Management.

Land and water are basic resources in every country. Wise management of these resources, whether for urban, agricultural, recreational, or other uses, may be the critical factor in determining the level of prosperity attained and maintained by the citizenry. This is especially true for countries which have large demands placed upon limited resources, such as arid lands in relation to water. Educational programs must be considered for all levels. Precollege students should acquire an appreciation for these critical resources. Undergraduate and graduate programs should be designed to meet the diverse demand for required expertise. Continuing education programs are needed for professionals and nonprofessionals who have responsibilities for guarding and managing these resources. With the rapid development of technology and methodologies, the half-life of acquired knowledge is now only a few years, so educational programs must be continually updated. The University of Arizona, in Tuson, is used as an example of how one educational institution deals with resource development and management education. (Muller-Arizona)
W74-01628

WATER RESOURCES PLANNING MOZAMBIQUE (LA PLANIFICATION DES RESOURCES EN EAU AU MOZAMIQUE),
Servicos Hidraulicos, Lourenco Marques (Mozambique).
C. D. de Ataide Fonseca.
Paper presented at International Symposium on Water Resources Planning, Mexico City, December 1972, 25 p, 4 fig.

Descriptors: Water resources, *Water allocation (Policy), *Planning, *Management, *Africa, Water resources development, Water requirements, Water demand, Water policy, Water supply development, Administration, Priorities, Regional development, Allotments.
Identifiers: *Mozambique.

Mozambique is characterized as an area of hot, oceanic temperature regime, with temperate plateau lands, predominantly dry and semiarid, with moderately humid coastlands. Precipitation ranges between 90 and 3,600 millimeters per year, with an average of about 968 mm. The annual average of 8 x 10 to the 10th power cubic meters of surface water, flowing principally in the Zambeze and Limpopo Rivers, is primarily utilized on site, rather than through a system of diversions. Although capabilities for hydroelectric power generation have reached 2.5 x 10 to the 8th power kwh in 1970, and some diversion projects exist, water distribution and optimum utilization remain a principal planning concern for this growing country. Mozambuque has reached a phase in development where the current and historic lack of water resource management is no longer acceptable, and definite planning measures must now be initiated which develop and allocate water resources in a manner that recognizes future expansion. Principal planning problems facing water administrators in Mozambique today are (1) determination of socio-economic water usage priorities, (2) uniform development of water resources throughout the country, and (3) harmonious management of international rivers. (Muller-Arizona)
W74-01629

VALUATION OF VISUAL-CULTURAL BENEFITS FROM FRESHWATER WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
T. R. Gupta, and J. H. Foster.
Journal of the Northeastern Agricultural Economics Council, Vol. 2, No. 1, p 262-263, Summer, 1973. 3 tab, 20 ref. OWRR B-023-MASS (5). 14-31-0001-3596.

Descriptors: *Wetlands, *Economics, Aesthetics, Northeast United States, *Massachusetts, *Recreation demand, Evaluation, Land use, *Social values, Attitudes.
Identifiers: Open spaces, *Visual cultural values.

The study has suggested an alternative to the 'willingness to pay' approaches to measuring the social value of natural open space and recreational resources. The method combines determination and measurement of the physical qualities of the resource by landscape architects with the measurement of value as expressed by the political system. It is illustrated by application to freshwater wetlands in Massachusetts. Wetlands with the highest visual-cultural values have a value, for this public purpose alone, of about $5,000 per acre. Based on a rating system developed by landscape architects, other wetlands will have a lower value for this purpose. Although this approach has certain weaknesses, it seems to produce valid dollar figures on which public purchase or other preservation decisions can be based. (Larson-Massachusetts)
W74-01643

CONCEPT-SCALE INTERACTION WITH THE SEMANTIC DIFFERENTIAL TECHNIQUE,
Virginia Polytechnic Inst. and State Univ, Blacksburg. Dept. of Sociology.
D. L. Klemmack, and J. A. Ballweg.
Journal of Psychology Vol 84, p 345-352, 1973. 1 table. OWRR A-038-VA (3).

Descriptors: *Recreation facilities, *Electric power, Water resources, *Attitudes, Social aspects, Psychological aspects, *Land use, Evaluation, *Social values.
Identifiers: Semantic differential technique, Concept-scale interaction.

The semantic differential technique is designed to serve as a method for measuring 'meaning.' It is a multidimensional rating scale based upon the assumption that words represent things. Basically, the semantic differential technique can be considered as a combination of scaling procedures and controlled associations. The subject is provided with a concept to be differentiated as well as a set of adjectival scales with which to do it. The respondent is asked to select a number from one to seven that most closely describes his interpretation of the association between the concept and the adjectival pair. In this study, adult respondents in an interview setting were asked to evaluate two concepts--use of a lake (a) as a source of electric power and (b) as a recreation area--by means of eight seven--point scales. Results indicate considerable concept-scale interaction, suggesting that Osgood's interpretation of the semantic differential may be restricted by both technique of data collection and subpopulation. Respondent hostility might be an intervening variable. The semantic differential technique appeared to yield a preliminary evaluation of the two concepts, suggesting its use as an indicator of orientation.
W74-01644

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA TEXTILE INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 05G.
W74-01101

RELATIONSHIP OF PUMPING LIFT TO ECONOMIC USE OF GROUNDWATER FOR IRRIGATION,
Idaho Univ., Moscow. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 04B.
W74-01120

A COST-EFFECTIVENESS STUDY AND ANALYSIS OF MUNICIPAL REFUSE DISPOSAL SYSTEMS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 05E.
W74-01631

VALUATION OF VISUAL-CULTURAL BENEFITS FROM FRESHWATER WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 06B.
W74-01643

6D. Water Demand

AGRICULTURAL WATER DEMAND IN NORTH CAROLINA: PHASES I AND II,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. E. Sneed, and R. S. Sowell.
Available from the National Technical Information Service as PB-225 130/4, $4.75 in paper copy, $1.45 in microfiche. Water Resources Research Inst. of the University of North Carolina. Rept. No. 83, September 1973. 142 p, 3 fig, 33 tab, 45 ref, 2 append. OWRR A-057-NC (1) 14-31-0001-3833.

Descriptors: *Water demand, Water management (Applied), Rate of application, Crop production, *Irrigation efficiency, *Water requirements, Irrigation practices, *North Carolina, *Computer models, *Water utilization.
Identifiers: Pitt County (NC).

A computerized water use model is developed and tested which determines the total water requirements for a given level of agricultural activity. A separable component of the model calculates both the aggregate water demands and the net economic return for alternative irrigation policies and crop-soil combinations. Input data include soils types and characteristics taken from soil surveys; crop acreage, timing, rooting depths, water requirements, and responses (yield) to irrigation; daily rainfall records; selling prices of crops; and irrigation costs. Output includes per acre and aggregate irrigation water requirements for each crop-soil combination for each time period; production levels, value of the production, cost of irrigation, and the net return to irrigation; and output data for alternative irrigation policies. (McJunkin-North Carolina)
W74-01112

WATER RESOURCES OF THE URAL AREA AND BASIC PROBLEMS IN THEIR COMPLEX USE (VODNYYE RESURSY URALA I OSNOVNYYE PROBLEMY IKH KOMPLEKSNOGO ISPOL'ZOVANIYA),
For primary bibliographic entry see Field 03E.
W74-01135

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH,
For primary bibliographic entry see Field 04A.
W74-01452

SIMULATION OF WATER RECREATION USERS' DECISIONS,
Kansas Univ., Lawrence. School of Business.
J. E. Gaumnitz, R. L. Swinth, and J. O. Tollefson.
Land Economics, Vol 49, No 3, p 269-277, August, 1973.

Descriptors: *Recreation demand, Water allocation (Policy), Recreation facilities, Demand

schedule (Recreation), Use rates, *Decision making.
Identifiers: *Water-based recreation selection process, *Discrimination nets.

The aim was to demonstrate the feasibility and merit of identifying the discrimination net by which an individual processes information on facility attributes when he makes a decision on water recreation usage. Individual discrimination nets were constructed by a process of trial, modification, and verification of a stable decision process involved with selecting 10 water recreation sites (sample size±17). Four primal conditions for usage were identified: (1) it must be a nice day; (2) the lake must be within 40 miles; (3) cost of entry cannot exceed $2.50; and (4) there must be picnic facilities. From the initial study, it was concluded that individuals can articulate their discrimination nets, discrimination nets are stable over time (initial check back period was 1 month), and that it would be feasible to obtain discrimination nets from large numbers of people, in terms of the time necessary for an interview and the necessary amount of training for an interviewer. Potentially, discrimination nets are a tool for analyzing the choices and preferences of a population to provide the planner with projections of usage rates and better explanations of the relationships between configuration of water recreation facilities and usage. (Hoffman-North Carolina)
W74-01464

WATER MASTER PLAN. EUGENE-SPRINGFIELD URBANIZING AREA.
Edmundson, Kochendoerfer, and Kennedy, Portland, Oreg.; and Daniel, Mann, Johnson, and Mendenhall, Portland, Oreg.
For primary bibliographic entry see Field 03D.
W74-01479

UTILITY PROVISIONS ANALYSIS FOR EAST CENTRAL FLORIDA.
Reynolds, Smith and Hills, Jacksonville, Fla.

Final report prepared for East Central Florida Regional Planning Council, Tallahassee. September, 1965. 126 p, 9 fig, 29 tab, 2 append.

Descriptors: *Planning, *Water supply, *Sewerage, *Florida, Water quality control, Urbanization, Administration, Financing, Institutions, Costs, Eutrophication, Groundwater, Water demand, Legislation, *Utilities, *Treatment facilities.
Identifiers: Utility expansion, Utility districts, Cape Kennedy (Fla).

A general, planning study is presented of problems and possible solutions related to water supply and sewerage systems for East Central Florida. The region includes the Cape Kennedy space center and is in a period of rapid urban development. The report focuses on the current status of water and sewerage systems in the area plus the water quality of lakes and streams, future water supply and sewerage needs, and the administration and financing of the expansion of these systems. Water supplies in coastal areas of the region are generally not sufficient to meet future needs and water will have to be imported from inland sources. Desalinization is not considered to be economically feasible. Water quality and fertilization of local lakes and streams are significant problems due to a lack of public treatment plants and a great number of small, inefficient private wastewater disposal systems. Wastewater systems must be expanded and consolidated and 90% removal of BOD required. However, utility systems expansion is severely constrained by organizational structure and financing problems. Florida law should be modified to allow countywide utility districts and intercounty utility functions; service rates should be raised to help finance system extensions. (Elfers-North Carolina)
W74-01480

AVAILABILITY OF FRESH WATER IN THE EAST CENTRAL FLORIDA PLANNING REGION.
Aase (George) and Associates, Inc., Tallahassee, Fla.

Final Report prepared for East Central Florida Regional Planning Council, Tallahassee, April 1965. 162 p, 4 append, 22 fig, 18 tab, 113 ref.

Descriptors: *Water supply, *Regional analysis, *Florida, *Data collections, Water resources development, Water sources, Water quality, Groundwater, Water storage, *Water demand, Urbanization, Artesian wells.
Identifiers: *St. Johns River Basin (Fla), *Cape Kennedy (Fla), Brevard County, Four River Basins Project.

A summary is presented of available water resource data including the total available fresh water in the region, which includes Cape Kennedy, the quality of the water resources, locations of potential future water supplies, water problems in the region, and possible solutions to the problems through 1980 with a projected population of approximately 1.6 million. The two main river basins in the region are the St. Johns and the Kissimmee. Much of the region is dotted with lakes, swamps, and marshes and has adequate water supply resources; however, the coastal areas, particularly Brevard County which is experiencing the most rapid urbanization, have limited fresh water supplies. Some of the possibilities for additional water supplies include the increased use of surface water in the St. Johns basin via several proposed storage reservoirs, the increased use of artesian water based on the Four River Basins Project which would provide reservoirs and other control works to create and enhance large groundwater recharge areas, salt water conversion, reuse of wastewater, and the suppression of evaporation. Recommendations include development of a water management plan with development of a broad regional plan for overall water management practices and procedures; consideration of development of a regional or multi-county system of water supply and distribution; evaluation of use of saline irrigation water; adoption of a well drilling code; expansion of treatment facilities to control pollution; possible construction of salt water barriers in coastal canals; careful regulation of existing artesian water supplies; and use of drainage and land use controls to protect water supplies. Methodology and data limitations are explained in Appendix I. (Elfers-North Carolina)
W74-01481

6E. Water Law and Institutions

INTERNATIONAL SCIENTIFIC AND TECHNICAL COOPERATION IN THE FIELD OF WATER PROBLEMS (MEZHDUNARODNOYE NAUCHNO-TEKHNICHESKOYE SOTRUDNICHESTVO V OBLASTI VODNYKH PROBLEM),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
N. V. Somov.
Vodnyye Resursy, No 2, p 163-171, 1973.

Descriptors: *Water resources development, *Regional development, *Water utilization, *Foreign projects, *Foreign countries, Governments, International Hydrological Decade, Organizations.
Identifiers: *USSR, Council of Mutual Economic Aid.

Present state and prospects of development of Soviet international cooperation in the field of water problems are reviewed. Emphasis is placed on Soviet scientific and technical ties with socialist countries (including member nations of the Council for Mutual Economic Aid) and on Soviet economic and technical assistance to the developing countries of Asia, Africa, and Latin America. (Josefson-USGS)
W74-01138

HEAVY METALS IN WASTEWATER AND TREATMENT PLANT EFFLUENTS,
Interstate Sanitation Commission, New York.
For primary bibliographic entry see Field 05A.
W74-01319

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR FACILITATORS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01367

INVENTORY AND EVALUATION OF INFORMATION ON DELAWARE BAY, VOLUME 2.
Natural and Historic Resource Associates, Philadelphia, Pa.

Available from NTIS, Springfield, Va 22151, COM73-10520 Price $3.00 printed copy; $1.45 microfiche. Delaware College of Marine Studies, Sea Grant report, November 1972. 236 p, 12 tab, 199 ref. Sea Grant No 1-35377.

Descriptors: *Delaware River, *Delaware River Basin Commission, *Bays, *Land use, *Regulation, Legal aspects, Management, History, Human population, Reviews, Evaluation, Dredging, Water pollution control, Water supply, Recreation, Hydroelectric power, Commercial fishing, Wetlands, Conservation, Harbors, Estuaries.
Identifiers: *Delaware Bay area.

This study describes the history, land use, and legal mechanisms which operate in the tideland region of the lower Delaware Bay. It traces the development of important legal precedents which involve the possession and use of property along the Bay, and examines existing and proposed ownership and land use patterns. The land area under scrutiny includes the tidelands, from Lewes north to the border of Kent and New Castle Counties in Delaware, and Cape May and Cumberland Counties in New Jersey. The most important laws and regulations which affect the Bay and its borders are summarized. In addition to considering Federal, interstate, state, county or municipality regulations, the willingness of the various authorities to use the legal means available to them to regulate changes in the Bay environment is discussed. (Woodard-USGS)
W74-01369

THE SHIPOWNER AND OIL POLLUTION LIABILITY,
For primary bibliographic entry see Field 05G.
W74-01447

VIRGINIA NATURAL RESOURCES LAW AND THE NEW VIRGINIA WETLANDS ACT,
For primary bibliographic entry see Field 02L.
W74-01448

MARINE POLLUTION: A CRITIQUE OF PRESENT AND PROPOSED INTERNATIONAL AGREEMENTS AND INSTITUTIONS--A SUGGESTED GLOBAL OCEANS' ENVIRONMENTAL REGIME,
San Francisco Univ., Calif.
For primary bibliographic entry see Field 05G.
W74-01449

THE INTERSTATE WATER POLLUTION COMPACT--PAPER TIGER OR EFFECTIVE REGULATORY DEVICE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05G.
W74-01450

WATER POLLUTION IN LOUISIANA: AN ATTEMPT AT CONTROL,
For primary bibliographic entry see Field 05G.
W74-01451

ARIZONA'S COMING DILEMMA: WATER SUPPLY AND POPULATION GROWTH,
For primary bibliographic entry see Field 04A.
W74-01452

IN RE SPRING VALLEY DEVELOPMENT (CHALLENGE TO ORDER OF ENVIRONMENTAL IMPROVEMENT COMMISSION DENYING DEVELOPMENT ALONG SIDE OF POND).

300 A.2d 736-755 (Maine 1973).

Descriptors: *Maine, *Judicial decisions, *Environmental effects, *Legal aspects, Public health, Comprehensive planning, Land use, Statutes, Regulation, Project planning, Water law, Legislation.

Action was brought by plaintiff subdivider challenging the State Environmental Improvement Commission's order denying the subdivider the right to proceed with its development of a 92-acre tract along one side of a pond until such time as the subdivider had made proper application to the Commission and had received the Commission's approval. The subdivider appealed on the grounds the statute involved was unconstitutionally vague and a violation of the equal protection clause. The appeals court held for the Commission, stating that the notice requirement of the statute involved is a reasonable exercise of the police power, is not unconstitutionally vague, and does not deny the equal protection of the law. Moreover, the court emphasized that the use of the word 'commercial' in the statute was intended to describe the motivation for the development and not the type of activity to be performed on the property after it is developed. (Mockler-Florida)
W74-01454

OPERATION OF WATERCRAFT.
Ind. Admin. Rules and Reg. Ann. secs (68-865)-5 thru (68-865)-7 (Supp. 1970).

Descriptors: *Indiana, *Legal aspects, *Boating regulations, Boats, Recreation, Bodies of water, Reservoirs, Aquatic environment, Regulation, Local governments, Wildlife development, Aquatic habitats, Hazards.
Identifiers: Administrative regulations.

Indiana annotated rules and regulations governing the operation of watercraft in the Salamonie Reservoir, the Mississinewa Reservoir, and the Huntington Reservoir are presented. Since there is great likelihood that intensive use will be made of these bodies of public water and the physical characteristics of the water and the uses made of portions thereof will create unusual hazards for life and property, there should be restrictions on the use of watercraft at these reservoirs for the purposes of safety and fish and wildlife management. Accordingly, regulatory markers should be placed by the department of natural resources on the reservoirs for the purpose of regulating watercraft activities thereon, so as to best protect life and property and to protect the fish and wildlife. Moreover, the bodies of water are to be divided into specific speed zones, as determined by the risk or hazard sought to be avoided. (Mockler-Florida)
W74-01455

SIERRA CLUB V. MASON (ACTION TO ENJOIN DREDGING OF NEW HAVEN HARBOR).

351 F. Supp. 419-429 (D. Conn. 1972).

Descriptors: *Judicial decisions, *Environmental effects, *Dredging, *Harbors, *Connecticut, Channel improvement, Legal aspects, Injunctive relief, Excavation, Water pollution control, Project planning, Water law.
Identifiers: *National Environmental Policy Act, *Injunctive relief.

The action was brought by plaintiff nonprofit environmentalist group against defendant U.S. Corps of Engineers to enjoin the dredging of New Haven, Connecticut, harbor and the depositing of dredging materials into Long Island Sound. Injunctive relief was granted by the court, notwithstanding defendant's allegations that an injunction would result in economic loss to the oil companies which used the harbor, that shoaling in the harbor had created a safety hazard, and that any delay would result in increased costs to the government. The court held that in view of the fact that the proposed dredging of the harbor, and in particular the proposed offshore dumping of polluted spoil, involved substantial likelihood of environmental damage, the failure to prepare an environmental impact statement warranted an injunction prohibiting the U.S. Army Corps of Engineers and other federal officials from proceeding with the proposed dredging and dumping until all alternatives could be fully considered. (Mockler-Florida)
W74-01456

A BILL TO ESTABLISH THE CANAVERAL NATIONAL SEASHORE IN THE STATE OF FLORIDA.

House Bill 137, 93rd Cong, 1st Sess, 1973. 5 p.

Descriptors: *Florida, *Legislation, *National seashores, *United States, Coasts, Recreation, Wildlife habitat, Water quality standards, Water pollution control, Governments, Comprehensive planning, Beaches.

This bill seeks to provide for public outdoor recreation use and enjoyment of certain significant shoreline lands and waters of the United States, and to preserve related scenic, scientific, and historic locations at Cape Canaveral, Florida. Within the boundaries of the seashore, the Secretary of the Interior may acquire lands, waters, and land interests by donation, purchase with donated or appropriated funds, exchange or transfer from any other federal agency. Property owned by the State of Florida or any political subdivision may be acquired only by the consent of the state or political subdivision. Moreover, the Secretary shall permit hunting, fishing, and trapping on lands and waters under his jurisdiction within the boundaries of the seashore in accordance with the appropriate laws of Florida and the United States to the extent applicable, except that he may designate zones where no hunting, fishing or trapping shall be permitted for reasons of public safety, administration, fish or wildlife management, or public use and enjoyment. The bill also authorizes appropriation of adequate money for the project. (Mockler-Florida)
W74-01457

A BILL TO ESTABLISH IN THE STATE OF CALIFORNIA THE SANTA MONICA MOUNTAIN AND SEASHORE NATIONAL URBAN PARK.
Senate Bill 1270, 93rd Cong, 1st Sess, 1973. 13 p.

Descriptors: *Legislation, *National parks, *United States, *Recreation, Scenery, Conservation, Wildlife habitat, Shore protection, Natural resources, Reasonable use, Land use, Land resources, Forests, Parks.

Special priority shall be given by the Secretary of the Interior (Secretary) to acquisition of lands which are of particular scenic, recreational, and open space value. These and other lands shall be administered by the Secretary through the National Park Service in cooperation with the California State Department of Parks and Recreation. The Secretary is empowered to: explore the possibility of obtaining grants and funds from appropriate government agencies to further land acquisition for the park; construct the necessary facilities to protect the values for which the park was established; and extend the benefits of the recreation and open space resource of the Santa Monica Mountain and seashore to the greater Los Angeles region. The legislation creates a commission to administer this program, the members of which shall serve for three years without compensation. The duties of this commission are listed and include advising the Secretary on proposed land uses and holding hearings on proposals for the acquisition of land. (Mockler-Florida)
W74-01458

MURFEE V. PHILLIPS PETROLEUM COMPANY (ACTION BY PROPERTY OWNERS AGAINST OIL AND GAS LESSEES FOR DIMINUTION OF MARKET VALUE OF LAND DUE TO POLLUTION OF UNDERGROUND FRESH WATER SUPPLY).
492 S.W. 2d 667-680 (Ct. Civ. App. Tex. 1973).

Descriptors: *Groundwater resources, *Texas, *Saline water intrusion, *Brines, *Subsurface drainage, Oil drilling, Geologic formations, Judicial decisions, Negligence, Water pollution, Limestone, Water pollution sources, Groundwater barriers, Water supply.
Identifiers: Proximate causation.

Plaintiff, the surface owner, brought suit against the oil lessees of his property, maintaining that the land's value had decreased due to the defendant's negligent disposal of brine water produced in thirty-five oil wells on the land. Plaintiff alleged that the defendants were negligent per se in that by pumping the brine water into open pits they had violated a railroad regulation providing that fresh water was to be protected from salt water produced in oil wells. Defendants maintained that the contamination had occurred due to the plaintiff's failure to case test holes drilled by him so that his contributory negligency barred his recovery. As to damages before the drilling of the test wells, the court found that the 100 foot limestone formation between the surface and the fresh water zones was a better barrier than anything the defendants could have constructed so that the plaintiff had failed his burden of showing the defendants' negligence. As to damages after the drilling of the test well, the court found that the invading salt water had entered through the test wells so that the plaintiff's contributory negligence precluded his recovery. (McKnight-Florida)
W74-01459

FLORIDA POLLUTION STATUTE INFRINGES UPON EXCLUSIVE FEDERAL MARITIME LEGISLATIVE DOMAIN, THE AMERICAN WATERWAYS OPERATORS, INC. V. ASKEW, 335 F. SUPP. 1241 (M.D. FLA).
For primary bibliographic entry see Field 05G.
W74-01460

THE PORTER-COLOGNE WATER QUALITY CONTROL ACT, AND RELATED WATER CODE SECTIONS (CONTAINING THE 1971 AMENDMENTS).
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05G.
W74-01461

CITY OF MONMOUTH V. ENVIRONMENTAL PROTECTION AGENCY (EPA SUED THE CITY TO PROHIBIT THE CITY FROM CONTINUING TO MAINTAIN A SEWAGE LAGOON SYSTEM WHICH WAS EMITTING NOXIOUS ODORS).

295 N.E. 2d 136-140 (3rd D.C.A. Ill 1973).

Descriptors: *Illinois, *Judicial decisions, *Environmental effects, Legal aspects, Public health, Air quality standards, Constitutional law, Air, Smog, Air pollution, Smoke, Environmental sanitation, Odor.
Identifiers: *National Environmental Policy Act, *Injunctive relief.

Action was brought by the Environmental Protection Agency against a city for the levey of a fine and an injunction to prohibit the city from continuing to maintain a sewage lagoon system which was emitting noxious odors. The Pollution Control Board fined the city $2,000 and required the city to cease the emission of odors within six months. On appeal, the court held the Environmental Protection Act does not require the Board to adopt standards establishing hydrogen sulfide levels or regulation the operation of open lagoon facilities and that the act itself establishes sufficient standards to define proscribed conduct and the scope of the authority. Moreover, in the case at bar, the Board's action had not been based on evidence of record, the techological practicability of abatement had not been investigated and the Board's findings were vague, inconsistent and ambiguous. As a result, the appeals court vacated the order and remanded the cause to the lower court for further proceedings. (Mockler-Florida)
W74-01462

AND NOT A DROP TO DRINK: WATER RESOURCES PLANNING AND ADMINISTRATION,
Harvard Univ., Cambridge, Mass.
M. M. Hufschmidt.
Public Administration Review, Vol 21, No 2, p 81-89, Spring, 1961.

Descriptors: *Water resources, *Administration, *Administrative agencies, *Governmental interrelations, *River basins, Arkansas, New York, Delaware, Coordination, Consolidation.
Identifiers: Decentralization, Arkansas-White-Red Basins, Delaware River, Inter-Agency Basin.

Dispersion of organization and administration responsibility among numerous federal and state agencies appears to characterize the water resource activities of government. Political strength in Congress of established agencies and strong preference for the status quo by affected interest groups contribute to this situation. Proponents of change have not clearly conceptualized their objectives, or explained them in terms that would command support beyond the argument that the comprehensive, multiple-purpose nature of the problem requires coordinated administration of water resource activities. Suggested approaches for reform are coordination of planning activities of existing agencies at the river basin level, combining of research, planning, development, and operation into unified management of a river basin by a single agency endowed with broad powers, and unifying planning and development procedures and policies on a national basis. Studies of the Arkansas-White-Red Basins Inter-agency Committee, the Delaware River Basin, and of the water resources of New York State are examined. Foremost among conclusions of this review of that two organizational approaches remain to be tried: (1) a consolidation of federal water-resource functions at the top, and their administrative decentralization to major regions or river basins, and (2) the establishment of regional water resource agencies, either Federal, or by interstate compacts in which the Federal Government plays a strong role. (Edwards-North Carolina)
W74-01465

TRI-AGENCIES PIPELINE: ENGINEERING REPORT.
San Diego County Water Authority, Calif.
For primary bibliographic entry see Field 08A.
W74-01477

ALLUVION, ISLANDS, AND SAND BARS,
K. Massari.
Tulane Law Review, Vol 47, p 367-380, 1973. 63 ref.

Descriptors: *Louisiana, *Legislation, *Alluvium, *Islands, *Sand bars, Judicial decisions, Coasts, Sands, Water pollution sources, Riparian rights, Legal aspects, Natural flow doctrine, Alteration of flow.

A comprehensive analysis is presented of alluvion, islands, and sand bars as defined and applied by the legislative scheme in Louisiana. Because the movement of a river or stream may either create, alter or destroy riparian property, the rich alluvial deposits that are formed by these bodies of water have created numerous title disputes in Louisiana and have given rise to an extensive body of creative jurisprudence. The legislative scheme incorporated in the Louisiana Civil Code articles 509 through 518 treats the five basic situations in which river forces change the ownership of riparian property. The laws of alluvion and dereliction are not applicable to lakes in Louisiana. (Mockler-Florida)
W74-01612

EARLY THOUGHTS ON PROSECUTING POLLUTERS,
Santa Clara, Univ., Calif.
For primary bibliographic entry see Field 05G.
W74-01613

A BILL TO BE KNOWN AS THE 'RIVER BASIN WASTE TREATMENT AUTHORITY ACT OF 1973'.

Senate Bill 1877, 93rd Cong, 1st Sess, 1973. 12 p.

Descriptors: *River basin commissions, *Waste treatment, *Waste water (Pollution), *Legislation, *United States, Water resources development, Governmental interrelations, Water quality, Water pollution control, Federal government.
Identifiers: River Basin Waste Treatment Authority Act of 1973.

The continued deterioration of the nation's water supply threatens the integrity of the national environment. Improvement in the cleanliness of the nation's waters is essential to the survival of the citizens and of the system, yet after two decades of experience with water pollution control efforts, the purity of water is no more assured todaay than it was when federal efforts first began. Thus, the federal government must act by creating river basin waste treatment authorities that will assume control over, plan, build, operate, and maintain waste treatment facilities sufficient to control and abate water pollution in entire river basin drainage systems. The Administrator of the Environmental Protection Agency, after consultation with the Secretary of the Army and the Secretary of the Interior shall designate river basin regions which together will encompass the entire United States. The area of each such region shall be determined on the basis of physical, hydrologic or other relationships which will enable the provision of the most systematic and economical waste treatment for the area. Each authority shall, within its region, operate all public waste treatment facilities. (McKnight-Florida)
W74-01614

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
For primary bibliographic entry see Field 05G.
W74-01615

A BILL TO AID THE CONSERVATION OF NATURAL WATER RESOURCES.

House Bill 823, 93rd Cong, 1st Sess, 1973. 1 p.

Descriptors: *Legislation, *Federal government, *North Carolina, *Virginia, Federal Power Act, Political restraints, Rivers, Conservation, Water resources, Scenery, Reservoir construction, Dams, Headwaters.
Identifiers: *New River (N.C.).

This bill is meant to aid the conservation of natural water resources and protect the scenic New River. To this end, notwithstanding any other provision of law, no federal agency or entity shall license or otherwise give permission either under the Federal Power Act or any other act of Congress, for the construction of any dam or reservoir on or directly affecting the New River from the tidewaters of its south and north forks to the town of Fries, Virginia. (Napolitano-Florida)
W74-01616

A BILL TO PROVIDE FOR THE ESTABLISHMENT OF THE GUANA RIVER NATIONAL PARK IN THE STATE OF FLORIDA.

House Bill 383, 93rd Cong, 1st Sess, 1973. 2 p.

Descriptors: *Legislation, *National parks, *Water conservation, *Florida, Parks, Wildlife conservation, Preservation, Scenery, Beach erosion, Beaches, Lakes, Ponds, Planning, Land, Conservation.

The bill provides for the establishment of the Guana River National Park in St. Johns County, Florida, on lands designated for that purpose by the Secretary of the Interior. The means by which these lands may be acquired are specified and include donation, purchase and exchange. Such funds are appropriated, as may be necessary to carry out the purposes of the proposed act. (Reed-Florida)
W74-01617

A BILL AUTHORIZING THE STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO INCREASE THE DIVERSION OF WATER FROM LAKE MICHIGAN INTO THE ILLINOIS WATERWAY.
House Bill 5542, 93rd Cong, 1st Sess, 1973. 3 p.

Descriptors: *Illinois, *Legislation, *Water quality, Lake Michigan, *United States, Water quality control, Channels, Erosion control, Conservation, Erosion, Water control, Shore protection, Shores, Legal aspects, Regulation, Administration, Water law.
Identifiers: *Water diversion.

The proposed bill authorizes Illinois and the Metropolitan Sanitary District of Greater Chicago, under the direction of the Secretary of the Army, to increase the diversion of water from Lake Michigan into the Illinois Waterway in order to control and eliminate water erosion on the shoreline of Lake Michigan and to improve the quality of the water in the Illinois Waterway. The Secretary may not allow any water in excess of a specified annual average discharge rate to be diverted from Lake Michigan at Chicago except as may be consistent with orders of approval issued by the International Joint Commission pursuant to the Boundary Water Treaty of 1909 or with any exchange of notes between the United States and Canada. No diversion is to be allowed when the

level of Lake Michigan is less than a specified average monthly level or when such diversion would interfere with the operation of the flood control system for the Illinois River and its tributaries. (Reed-Florida)
W74-01618

DESIGNATING A SEGMENT OF THE ST. CROIX AS PART OF WILD AND SCENIC RIVERS SYSTEM.

1972 Hearing--Subcomm. on Public Lands--Comm. on Interior and Insular Affairs, United States Senate, 92nd Cong, 1st and 2d Sess, October 23, 1971, April 14, 1972. 180 p, 1 plate.

Descriptors: *Legislation, *Wild River Act, *Rivers systems, Recreation, Legal aspects, Scenery, Water policy, Water quality control, Running waters, Federal government, Governmental interrelations, *Minnesota, *Wisconsin.
Identifiers: *St. Croix River (Minn and Wis).

A bill is presented to amend the Wild and Scenic Rivers Act by designating a segment of the St. Croix River in Minnesota and Wisconsin as a component of the national wild and scenic rivers system. A study of the lower St. Croix by the Department of Interior concludes that the lower St. Croix merits inclusion in the national rivers system. The legislation should, ideally, be passed soon in order to preclude destruction of the scenic beauty of the lower St. Croix by intrusions of construction within the line of slight from the river. Statements from representatives of various state and federal agencies indicate that the lower St. Croix and its immediate environment possess outstandingly remarkable scenic and aesthetic, recreational, and geologic values, and that the river should be protected for the benefit and enjoyment of present and future generations. It has been recommended that a master plan for the protection and management of the riverway should be developed and used by all management entities. (Mockler-Florida)
W74-01619

THE MANAGEMENT OF BAY AND ESTUARINE SYSTEMS IN THE TEXAS COASTAL ZONE, PHASE II.
Texas Univ., Austin. Div. of Natural Resources and the Environment.
For primary bibliographic entry see Field 05G.
W74-01620

6F. Nonstructural Alternatives

CONSOLIDATION OF IRRIGATION SYSTEMS: PHASE 1, ENGINEERING, LEGAL, AND SOCIOLOGICAL CONSTRAINTS AND/OR FACILITATORS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01367

A LINEAR PROGRAMMING APPROACH TO FLOODPLAIN LAND USE PLANNING IN URBAN AREAS,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 03D.
W74-01490

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT,
Geological Survey.
For primary bibliographic entry see Field 04A.
W74-01611

6G. Ecologic Impact of Water Development

PROMOTING ENVIRONMENTAL QUALITY THROUGH URBAN PLANNING AND CONTROLS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 05D.
W74-01470

TALLAHALA CREEK LAKE, PASCAGOULA RIVER BASIN. MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District. Mobile, Ala.
For primary bibliographic entry see Field 04A.
W74-01610

TALLULAH CREEK WATERSHED (LONG CREED PORTION) GRAHAM COUNTY, NORTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-01621

07. RESOURCES DATA

7B. Data Acquisition

COMPARISON OF GAGE AND RADAR METHODS OF CONVECTIVE PRECIPITATION MEASUREMENT,
National Oceanic and Atmospheric Administration, Coral Gables, Fla. Experimental Meteorology Lab.
For primary bibliographic entry see Field 02B.
W74-01149

NEAR REAL TIME WATER RESOURCES DATA FOR RIVER BASIN MANAGEMENT,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 04A.
W74-01150

UTILIZATION OF REMOTE SENSING IN RIVER BASIN STUDIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05A.
W74-01154

ARCTIC DATA BUOYS AND AIDJEX,
Washington Univ., Seattle.
P. Martin.
In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22, p 1-7, August 1973. 3 fig, 5 ref.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, Water temperature, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, Hydrologic data, Instrumentation, Telemetry.

Drifting stations have been used since 1893 to collect data in the Arctic Ocean. Conditions in the Arctic present special challenges to the operation of both manned and unmanned drifting stations. Modern technology has made possible unmanned data buoys which can greatly improve data coverage. AIDJEX is participating in the development and use of sea-ice data buoys which will also be required by future polar scientific programs. The Soviets were the first to develop a data buoy specifically for arctic conditions. Called the DARMS (Drifting Automatic Rdio-Meteorological Station), these buoys monitor ice and weather conditions along the Northern Sea Route. Several hundred of them have been deployed since 1956. New arctic data buoys incorporate recent technological advances. Solid-state electrical components and the utilization of satellites for positioning and data relay have already been demonstrated. (Knapp-USGS)
W74-01156

THE ARCTIC DATA BUOY, A SYSTEM FOR ENVIRONMENTAL MONITORING IN THE ARCTIC,
Washington Univ., Seattle. Applied Physics Lab.
D. P. Haugen, and E. G. Kerut.
In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experimnt) Bulletin No 22, p 37-53, August 1973. 5 fig, 3 tab, 12 ref. NASA NAS-8-26886.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, Water temperature, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, Hydrologic data, Instrumentation, Telemetry.

An automated data buoy system was developed for environmental monitoring in ice-covered oceans. The buoy operates for a minimum of one year, providing position and environmental data through polar-orbiting satellite telecommunications. It can be deployed by a two- or three-man crew using a small aircraft. It is capable of operating in both free-floating and frozen-in situations. An experimental unit successfully completed a 5-month test at Fletcher's Ice Island (T-3) during the winter of 1971-72, and six units were deployed in the Arctic during the spring of 1972. Four of these units have been in operation for more than 1 year. Results to date demonstrate the utility of the basic design, the effectiveness of the satellite communications, and the feasibility of deploying and operating a large array of such buoy systems in the Arctic Ocean. (Knapp-USGS)
W74-01158

BAROMETRIC PRESSURE MEASUREMENTS FROM BUOYS DURING AIDJEX 1972,
Washington Univ., Seattle.
P. Martin.
In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22 p 89-111, August 1973. 11 fig, 2 tab, 2 ref. NSF Contract C-625.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, *Atmospheric pressure, Water temperature, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, Hydrologic data, Instrumentation, Telemetry.

Two types of buoys were deployed in an array around the main camp during AIDJEX 1972 to obtain barometric pressure measurements. Comparison of portable standards and the mercury barometer revealed significant errors in the mercury barometer readings caused by temperature flucutations, and a calibration drift in one of the portable standards: The calibrations are probably accurate to a few tenths of a millibar. Relative precision is about 0.1 mb, which is better than the relative precision of the standards. An observation of an unusual pressure feature was confirmed by duplicate buoys at one site. (Knapp-USGS)
W74-01159

A RESONANT CAPSULE PRESSURE TRANSDUCER FOR DATA BUOYS,
Kollsman Instrument Corp., Syosset, N.Y.
E. H. Kahn.
In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22 p 113-137, August 1973. 11 fig, 2 tab.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, *Atmospheric pressure, Water tempera-

ture, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, Hydrologic data, Instrumentation, Telemetry.

Recent advances in avionics pressure instrumentation resulted in the ability to measure atmospheric pressure with a high degree of accuracy. The fundamental technique is based on the resonant frequency of an aneroid capsule whose frequency varies with pressure. A new RCPT magnetic drive system features low-power operation and low-production cost. The state of the art is summarized and a low-power demonstration transducer being built for evaluation by the NOAA Data Buoy Office for use by AIDJEX and other members of the oceanographic community is described. (Knapp-USGS)
W74-01160

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY REPORTS.
For primary bibliographic entry see Field 07C.
W74-01163

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab.
For primary bibliographic entry see Field 04A.
W74-01165

MINERAL RESOURCES, GEOLOGICAL STRUCTURE AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01166

ENVIRONMENT SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 05A.
W74-01167

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01168

MARINE RESOURCES AND OCEAN SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
J. R. Greaves.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 70-82, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Oceanography, Data collections, Sea ice, Turbidity, Sounding, Surveys, Tracers, Ocean circulation.
Identifiers: *ERTS.

A synopsis is given of the significant results achieved within the Marine Resources and Ocean Surveys discipline of the overall ERTS program. Suspended sediment proved to be the most clearly visible feature in the nearshore water, allowing limited correlation between the actual sediment load and photographic film density. Sediment acts as a tracer, allowing nearshore circulation (current) patterns, direction of net water transport, and boundaries between different water masses to be discerned. In clear water, the use of contrast enhancement as well as optical and digital density slicing can be used to infer relative depths in 2-, 5-, and 10-meter steps from the surface down to about 20 meters. An analytic technique calculates absolute depth values based upon the ratios of adjacent MSS channels where some knowledge of bottom reflectivity is available. Sea ice is detectable in all of the ERTS MSS spectral bands and can be distinguished from clouds through a number of interpretive keys. MSS Bands 4 and 7 can be combined to infer the presence of meltwater on the ice and to map snowlines on glaciers. ERTS provides the data for the development of satellite techniques to measure water color, infer circulation and upwelling, and possibly infer temperature and salinity regions by correlation with other surface-acquired data. The measurement of water color may further be related to chlorophyll and turbidity. (See also W74-01163) (Knapp-USGS)
W74-01169

INTERPRETATION TECHNIQUES DEVELOPMENT,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
W. L. Alford.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 83-94, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Data processing, Data collections, Photogrametry.
Identifiers: *ERTS.

Both optical and digital methods of spatial information extraction can provide valuable sources of data information from the ERTS system. Current emphasis is being placed on machine-aided photoanalysis, image correction and enhancement, and automated data processing. The techniques available, even for a limited number of bands (4) and limited resolution (80-meters IFOV) can be effectively used to extract much of the information required by resource managers. (See also W74-01163) (Knapp-USGS)
W74-01170

MULTIDISCIPLINARY/REGIONAL RESOURCE SURVEYS,
National Aeronautics and Space Administration, Wallops Island, Va. Wallops Station.
G. H. Trafford.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md, March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 95-101, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), Surveys, Resources, *Land use, Geologic mapping, Water pollution, Data collections, Data processing.
Identifiers: *ERTS.

The usefulness of ERTS MSS black-and-white and false-color imagery in the 0.5- to 0.8-micron region is clearly demonstrated for land-use classification at regional, county, and city levels. ERTS MSS imagery yields enhanced geologic interpretation. Spatial filtering, as an image enhancement technique for lineament directional filtering, appears particularly promising for additional refinement at the user technology level. Black-and-white and false-color imagery in the 0.5- to 1.1-micron region in useful for resource surveys. MSS Band 5 (0.6 to 0.7 micron) coupled with the synoptic view afforded by ERTS shows sediment stream loading, lake sedimentation, and offshore efflux, and is also effective in monitoring smoke plumes on a repetitive basis. (See also W74-01163) (Knapp-USGS)
W74-01171

TIDEWATER SHORELINES IN BROWARD AND PALM BEACH COUNTIES, FLORIDA: AN ANALYSIS OF CHARACTERISTICS AND CHANGES INTERPRETED FROM COLOR, COLOR INFRARED AND THERMAL AERIAL IMAGERY,
Florida Atlantic Univ., Boca Raton. Remote Sensing and Interpretation Lab.
For primary bibliographic entry see Field 02L.
W74-01220

FOOD CONSUMPTION OF THE FREE-LIVING AQUATIC NEMATODE PELODERA CHITWOODI,
Auburn Univ., Montgomery, Ala. Dept. of Biology.
For primary bibliographic entry see Field 05A.
W74-01225

A SIMPLE PORTABLE FIELD NEPHELOMETER,
W. H. Moore.
Freshwater Biol. Vol 2, No. 3, p 279-283. 1972, Illus.
Identifiers: Lakes, *Nephelometers, Portable instruments, *Suspended solids.

A portable field nephelometer is described, capable of indicating in situ differing layers of suspended material in a body of water to a depth of 30 m. Results were compared with those from a standard transparency meter, and a laboratory nephelometer.--Copyright 1973, Biological Abstracts, Inc.
W74-01247

TECHNIQUES FOR MEASURING LIGHT ABSORPTION SCATTERING, AND PARTICLE CONCENTRATIONS IN WATER,
Environmental Research Inst. of Michigan, Ann Arbor.
O. E. Prewett, D. R. Lyzenga, and F. C. Polcyn.
Available from NTIS, Springfield, Va., 22151, AD-759 668, Price $3.00 printed copy; $1.45 microfiche. Final Report prepared for NOAA, National Environmental Satellite Service, Washington, D.C., April 1973. 17 p, 6 fig, 4 tab, 5 ref. NAVOCEANO N62306-71-C-0108.

Descriptors: *Remote sensing, *Suspended solids, *Surface waters, *Light intensity, *Aquatic environment, Light penetration, Aerial photography, Analytical techniques, Lakes, Turbidity, Sediment transport.
Identifiers: *Multispectral scanner imagery, Scattering models, Water particle concentrations.

The usefulness of multispectral remoate sensing techniques was investigated in determining the concentration of suspended solids in aquatic environments. Aerial photography and multispectral scanner imagery are used to record the upwelling radiation at various locations on the surface of the water. Procedures for determining the concentration of suspended solids are explored. Two techniques are discussed: the first applies to bodies of water that are shallow and fairly clear; the second applies to bodies of water that are deep or very turbid. The first technique is a direct outgrowth of earlier water-depth studies and, when the necessary ground-truth data are available, can also be used to determine water depth or the scattering and adsorption coefficients of the lake. The second has the advantage of requiring less ground-truth data for interpretation of the remote measurements. Both techniques are feasible within certain operational constraints. Both give values of the concentration of suspended solids, relative to the concentration at a fixed point, for every location in a body of water for which multispectral data are available. The absolute values of the concentration at all points can be determined, however, if the absolute concentration is known at a single point. (Woodard-USGS)
W74-01283

WAVE-INDUCED WATER PARTICLE MOTION MEASUREMENTS,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02E.
W74-01285

APPLICATION OF INFRARED FOURIER TRANSFORM SPECTROSCOPY TO ANALYSIS OF MICRO SAMPLES,
Dow Chemical Co., Midland, Mich. Analytical Labs.
For primary bibliographic entry see Field 02K.
W74-01303

A COMPARISON OF FAST DESTRUCTION METHODS FOR THE DETERMINATION OF TRACE METALS IN BIOLOGICAL MATERIALS,
Brussels Univ. (England). Pharmaceutical Inst.
For primary bibliographic entry see Field 05A.
W74-01317

IMPROVED DISTILLATION METHOD FOR VOLATILE ACIDS ANALYSIS,
Somerset Raritan Valley Sewerage, Somerville, N.J.
For primary bibliographic entry see Field 05A.
W74-01322

NOVEL METHOD OF RAMAN DATA ACQUISITION,
Campinas Univ. (Brazil). Gleb Wataghin Inst. of Physics.
For primary bibliographic entry see Field 02K.
W74-01330

AUTOMATED RAPID SCAN INSTRUMENT FOR SPECTROELECTROCHEMISTRY IN THE VISIBLE REGION,
Naval Research Lab., Washington, D.C. Electrochemistry Branch.
For primary bibliographic entry see Field 02K.
W74-01331

SEMIINTEGRAL ELECTROANALYSIS: SHAPES OF NEOPOLAROGRAMS,
Trent Univ., Peterborough (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01333

VERSATILE COMPUTER GENERATED VARIABLE ACCELERATING VOLTAGE CIRCUIT FOR MAGNETICALLY SCANNED MASS SPECTROMETERS. USE FOR ASSAYS IN THE PICOGRAM RANGE AND FOR ASSAYS OF STABLE ISOTOPE TRACERS,
Washington Univ., St. Louis, Mo. Biomedical Computer Lab.
For primary bibliographic entry see Field 02K.
W74-01335

SIMPLE INEXPENSIVE FREEZE-DRYING PROCEDURE,
Bureau of Alcohol, Tobacco and Firearms, Cincinnati, Ohio.
J. W. Young, and G. D. Christian.
Analytical Chemistry, Vol 45, No 7, p 1296, June 1973.

Descriptors: *Analytical techniques, *Methodology.
Identifiers: *Freeze drying, *Serum, Sample preparation, Blood.

Serum can be rapidly and inexpensively lyophilized for analysis by immersing and gently swirling a beaker containing the serum in a bath of dry ice and acetone. After the serum is frozen on the beaker in a thin film, a vacuum desiccator is attached and a vacuum applied until the sample is dried. No loss occurs with this procedure, and a 1-ml sample can be dried in about 30 min. (Little-Battelle)
W74-01339

NEW DETECTOR FOR ION-EXCHANGE CHROMATOGRAPHY,
Cincinnati Univ., Ohio. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01343

MOLECULE-SIZE DISTRIBUTION OF SOLUBLE HUMIC COMPOUNDS FROM DIFFERENT NATURAL WATERS,
For primary bibliographic entry see Field 02H.
W74-01351

COMPARISON OF THE SNOW RESISTOGRAPH WITH THE RAM PENETROMETER,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
For primary bibliographic entry see Field 02C.
W74-01381

GEOPHYSICAL MEASUREMENTS OF THE THICKNESS OF THE MALYY AZAU GLACIER (GEOFIZICHESKIYE OPREDELENIYA MOSHCHNOSTI LEDNIKA MALYY AZAU),
Moscow State Univ. (USSR). Problemnaya Laboratoriya Kompleksnogo Kartografirovaniya i Atlasov.
For primary bibliographic entry see Field 02C.
W74-01390

USE OF ISOTOPIC METHODS TO DETERMINE PRESENT RATES OF SNOW ACCUMULATION IN ANTARCTICA (ISPOL'ZOVANIYE IZOTOPNYKH METODOV DLYA OPREDELENIYA SOVREMENNOY SKORSTI NAKOPLENIYA SNEGA V ANTARKTIDE),
Akademiya Nauk SSSR, Moscow. Institut Geokhimii i Analiticheskoi Khimii.
For primary bibliographic entry see Field 02C.
W74-01393

AN OXYGEN ELECTRODE MICRORESPIROMETER,
Newcastle-upon-Type Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 05A.
W74-01419

SMALL-VOLUME SOLID-ELECTRODE FLOW--THROUGH ELECTROCHEMICAL CELLS. PRELIMINARY EVALUATION USING PULSE POLAROGRAPHIC TECHNIQUES,
Hoffmann-La Roche, Inc., Nutley, N.J. Animal Health Research.
A. MacDonald, and P. D. Duke.
Journal of Chromatography, Vol 83, p 331-342, August 29, 1973. 9 fig, 33 ref.

Descriptors: *Instrumentation, *Equipment, Electrochemistry, Automatic control, Flow rates, Measurement, Polarographic analysis, Evaluation, Stability, Methodology.
Identifiers: *Performance evaluation, *Electrochemical cells, *Pulse polarography, *Solid electrodes, Detectors, Liquid chromatography, Sensitivity, p-Aminophenol.

A preliminary evaluation is given of the use of potentiostatic pulse polarographic techniques for solid-electrode flow-through electrochemical cells as detectors for use in both automated analysis and liquid chromatography. The following advantages are noted over previously reported constant-applied-potential techniques: increased sensitivity, minimal effect of flow-rate on current measurement and a vast increase in electrode stability for the short-term sampling period and for extended routine operation. (Holoman-Battelle)
W74-01445

ESTIMATION OF DOMAIN MEANS USING TWO-PHASE SAMPLING,
Central Bureau of Statistics, Accra (Ghana).
K. T. deGraft-Johnson, and J. Sedransk.
Biometrika, Vol 60, No 2, p 387-393, August 1973. 2 ref.

Descriptors: *Estimating, Statistical methods, Sampling.
Identifiers: *Two-phase sampling, *Domain means, Sample size.

To estimate means of subpopulations or 'domains of study' where there is no list of units comprising each domain, a two-phase sampling procedure may be employed. One possibility is to select a simple random sample of size n prime with the domain to which each unit belongs being determined. Then a simple random subsample of size n sub j is selected from the n prime sub j units found in the first phase sample to be members of the jth domain. Given the values of the n prime sub j it is desired to allocate a fixed total second phase sample size, n, to the domains in an optimal manner. Then one may determine the optimal choices for n prime and n. Alternatively, one may use a stratified random sample of size n prime with n prime sub h units being selected from the hth stratum. Given that the first phase sample yields n prime sub hj units in the hth stratum, jth domain, the number of units, n sub hj to be subsampled by simple random sampling is to be determined to maximize a measure of precision. (Little-Battelle)
W74-01498

ROTAMETER.

Measurements and Data, Vol 7, No 4, p 122-127, July/August 1973. 4 fig, 2 tab.

Descriptors: *Design criteria, *Flowmeters, Equations, Mathematical studies, Flow rates, Mechanical equipment.
Identifiers: *Rotameters.

Rotameters are of four general types: purge meters, glass-tube general-purpose meters, armored meters, and special-purpose meters. The meters can be adapted for use at low or high fluid pressures, and to monitor flow of caustic or corrosive as well as bland fluids. Although the units are frequently inexpensive they are accurate and reliable. A list of commercially available units with descriptive information and prices is given along with the derivation of the basic rotameter flow equation. (Little-Battelle)
W74-01500

ULTRASONIC THERMOMETRY,
Panametrics, Inc., Waltham, Mass.
L. C. Lynnworth, and E. P. Papadakis.
Measurements and Data, Vol 7, No 4, p 84-87, July/August 1973. 6 fig.

Descriptors: *Water temperature, Electronic equipment, Gases.
Identifiers: *Ultrasonic thermometry.

Ultrasonic thermometry is discussed with regard to measurement principles, instrumentation techniques, resonant and esonant sensors, impulse-induced-resonance, thermomechanical techniques, and future potential. Representative equipment is illustrated. (Little-Battelle)
W74-01501

ION SELECTIVE SENSORS,
State Univ. of New York, Buffalo. Dept. of Chemistry.

For primary bibliographic entry see Field 05A.
W74-01506

DOUBLE PULSE COULOSTATICS,
Northern Illinois Univ., DeKalb. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01511

GLASS-METAL COMPOSITE ELECTRODES,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-01512

ION-ELECTRODE BASED AUTOMATIC GLUCOSE ANALYSIS SYSTEM,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-01513

GUIDE TO SELECTING GRAPHIC DISPLAYS,
A. Krigman.
Instruments and Control Systems, Vol 46, No 9, p 87-91, September 1973. 1 tab.

Descriptors: *Design criteria, Monitoring, Electronic equipment.
Identifiers: *Data displays.

Guidelines are presented to assist in the design of graphic displays which will provide information to operators in an optimum fashion. Among the topics discussed are display formats, lighting, configuration, engineering, and physical parameters. Manufacturers and brief system descriptions are listed. (Little-Battelle)
W74-01519

SOME EFFECTS OF FILTRATION ON THE DETERMINATION OF NUTRIENTS IN FRESH AND SALT WATER,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
K. T. Marvin, R. R. Proctor, Jr., and R. A. Neal.
Limnol Oceanogr. Vol 17, No 5, p 777-784. 1972.
Identifiers: *Filtration, *Nutrients, Water samples, Filters, Fresh water, Salt water.

The nutrient concentration of samples of water often changes significantly during filtration. Six types of filters and 4 nutrients in fresh- and also salt-water solution were tested. Two major sources of variation were elution of nutrients from the filters by the water samples and, conversely, adsorption of nutrients from the sample by the filter.--Copyright 1973, Biological Abstracts, Inc.
W74-01521

PANKHURST TUBES MODIFIED TO INDICATE ANAEROBIOSIS,
Nairobi Univ. (Kenya).
For primary bibliographic entry see Field 05A.
W74-01545

CHOOSING A STATIC INVERTER SYSTEM,
Continental Oil Co., Ponca City, Okla. Maintenance Engineering Dept.
N. L. Conger.
Instrumentation Technology, Vol 20, No 9, p 57-65, September 1973. 7 fig, 5 tab, 6 ref.

Descriptors: *Design criteria, Maintenance.
Identifiers: *Static inverter systems, *Power supplies, Batteries, Inverters, Chargers.

Data are given on the key specifications for hardware available from ten manufacturers of static inverter systems which serve as power backups. The similarities and differences of the systems are highlighted. A checklist is included to assist in specifying, purchasing, and installing a system. (Little-Battelle)
W74-01547

A NEW TYPE OF CLIMATIZED GAS EXCHANGE CHAMBER FOR NET PHOTOSYNTHESIS AND TRANSPIRATION MEASUREMENTS IN THE FIELD,
Wuerzburgh Univ. (West Germany). Boranisches Institut II.
For primary bibliographic entry see Field 02I.
W74-01568

A RELIABLE AND INEXPENSIVE SOIL FROST GAGE,
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
For primary bibliographic entry see Field 02G.
W74-01574

SEPARATION AND IDENTIFICATION OF CARBOFURAN, ITS METABOLITES, AND CONJUGATES FOUND IN FISH EXPOSED TO RING C--14-LABELED CARBOFURAN USING ITLC SILICA GEL STRIPS,
Illinois Univ., Urbana. Agricultural Experiment Station.
For primary bibliographic entry see Field 05A.
W74-01577

AN AUTOMATIC SEPARATOR FOR THE REMOVAL OF AQUATIC INSECTS FROM DETRITUS,
National Inst. for Physical Planning and Construction Research, Dublin (Ireland).
E. Fahy.
J Appl Ecol., Vol 9, No 2, p 655-658. 1972. Illus.
Identifiers: *Aquatic insects, *Automatic separation, *Detritus, Electricity.

In the apparatus describes, insects are stimulated electrically so that they move into a water current which conveys them to collection sieves from which they are recovered.--Copyright 1973, Biological Abstracts, Inc.
W74-01624

7C. Evaluation, Processing and Publication

PREDICTION OF WELL DEVELOPMENT POSSIBILITIES IN DELAWARE BY MEANS OF CALIBRATED GAMMA-RAY LOGS,
Delaware Geological Survey, Newark.
For primary bibliographic entry see Field 04B.
W74-01106

PRECIPITATION VARIABILITY OVER NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
For primary bibliographic entry see Field 02B.
W74-01111

A STOCHASTIC MODEL OF STREAMFLOW BASED ON THE THEORY OF FUNCTIONS OF MARKOV PROCESSES,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 02E.
W74-01123

A DETERMINISTIC PARAMETRIC WATER--BALANCE MODEL,
Norwegian Water Resources and Electricity Board, Oslo.
For primary bibliographic entry see Field 02A.
W74-01126

NUMERICAL SIMULATION OF THE RAINFALL-RUNOFF PROCESS ON A DAILY BASIS,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
For primary bibliographic entry see Field 02A.
W74-01127

DEVELOPMENT OF A CONCEPTUAL DETERMINISTIC RAINFALL-RUNOFF MODEL,
Swedish Meteorological and Hydrological Inst., Stockholm.
For primary bibliographic entry see Field 02A.
W74-01128

DIVISION OF THE UNITED STATES INTO REGIONS ACCORDING TO COPHASAL FLUCTUATIONS OF ANNUAL RUNOFF (RAYONIROVANIYE TERRITORII SSHA PO SINFAZNOSTI KOLEBANIY GODOVOGO STOKA REK),
For primary bibliographic entry see Field 02E.
W74-01140

ENGINEERING CHARACTERISTICS OF OVERBURDEN IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
L. D. Harris, and J. M. Kellberg.
Available from USGS, Washington, D.C. 20402 Price $0.75. Miscellaneous Geologic Investigations Maps I-767 K, 1972. 1 sheet, 1 map, 1 tab.

Descriptors: *Overburden, *Earth materials, *Geologic mapping, *Tennesses, Sediments, Soils, Rocks, Engineering structures, Design criteria, Particle size, Clays, Sands, Silts, Gravels, Gemorphology, Weathering, Erosion, Geological surveys.
Identifiers: *Knox County (Tenn).

This one-sheet geologic atlas describes engineering characteristics of overburden in Knox County, Tenn. Most manmade small- and medium-sized structures in the county are founded on unconsolidated material. Because engineers are primarily concerned with the physical properties of unconsolidated materials that directly affect engineering design and construction, they prefer to use the Unified Soil Classification System (included in this report) which stresses the engineering characteristics of unconsolidated materials. Soil or overburden as defined by engineers includes the soil and weathered rock down to bedrock. Subdivisions of the Unified Soil Classification System are based on the size of particles and their proportions, physical behavior, and the amount of organic material. The map, although generalized, is intended as a guide in the early planning stage of an engineering project. (Woodard-USGS)
W74-01143

OVERBURDEN RELATED TO TYPE OF BEDROCK AND ENGINEERING CHARACTERISTICS OF THE BEDROCK, KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
L. D. Harris, and J. M. Kellberg.
For sale by USGS, Washington, D.C. 20242 Price $0.75 per set. Miscellaneous Geologic Investigations Map I-767 J, 2 sheets, 1972. 1 map, 1 tab, 9 ref.

Descriptors: *Overburden, *Earth materials, *Bedrock, *Geologic mapping, *Tennessee, Sediments, Soils, Rocks, Geologic formations, Geological surveys, Engineering, Weathering, Erosion, Geomorphology, Chemical reations.
Identifiers: *Knox County (Tenn.).

This 2-sheet map folio describes unconsolidated earth materials and bedrock in Knox County, Tenn. In this report, the term overburden includes all unconsolidated material and weathered rock

down to hard bedrock. The thickness of the overburden is a function of the climate, the resistance of minerals in the bedrock to weathering, the abundance of fractures or cracks in the rock, the attitude of bedding, the volume of insoluble material (residue) remaining after weathering, and the rate of erosion. The depth of weathering is nearly proportional to the amount of carbonate minerals orginally present in the bedrock. Drill records of approximately 300 wells indicate that rocks with few or no carbonate minerals (such as shale with subordinate limestone and siltstone, sandstone, and shale) may weather to depths of as much as 25 feet; rocks which contain as much as 45% carbonate as cement (such as calcareous sandstone with subordinate shale, calcareous siltstone with subordinate limestone and shale) may locally weather to depths in excess of 100 feet. (Woodard-USGS)
W74-01144

CATEGORIES OF RELATIVE FEASIBILITY FOR SEPTIC-TANK FILTER FIELDS IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
L. D. Harris.
For sale by USGS, Washington, D.C. 20402 Price $0.75. Miscellaneous Geologic Investigations Map I-767 L, 1 sheet, 1972. 1 map, 7 ref.

Descriptors: *Geologic mapping, *Septic tanks, *Soil disposal fields, *Tennessee, *Soil filters, Waste disposal, Sewage, Water pollution sources, Water pollution control, Geomorphology, Soil types, Geological surveys.
Identifiers: *Knox County (Tenn.).

This map (scale 1:250,000) classifies land in Knox County, Tennessee, according to its natural physical capabilities to support the installation of septic-tank fields. Although the map indicates to planners the general suitability of a large area, sufficient data are not shown to predict the absolute suitability of a single small building site. Onsite evaluation of individual building sites is recommended. Factors limiting the usefulness of septic-tank filter systems as suggested in U.S. Public Health Service (1969) and Bender (1961) are: percolation rate, groundwater level, soil drainage on shale, depth to bedrock, slope of the ground, proximinty to other bodies of water, and flood hazard. (Woodard-USGS)
W74-01145

SOIL ASSOCIATION MAP OF KNOX COUNTY, TENNESSEE.
Geological Survey, Washington, D.C.

For sale by USGS, Washington, D.C. 20242 Price $0.75. Miscellaneous Geologic Investigations Map I-767 H, 1 sheet, 1972. 1 map, 1 tab.

Descriptors: *Soil classification, *Soil types, *Geologic mapping, *Tennessee, *Soil formation, Soil groups, Soil chemical properties, Earth materials, Soil analysis, Weathering, Geomorphology, Erosion, Geological surveys.
Identifiers: *Knox County (Tenn.).

This map, scale 1:125,000, and related information describe the soil association in Knox County, Tenn. Parent materials of soils in the county are of two broad classes: (1) material derived from weathering of sedimentary rocks in place (residuum), and (2) materials transported by gravity (colluvium) or by streams (alluvium). Distribution of soils derived from residuum is closely controled by the distribution of different sedimentary rocks. Weathering of these rocks has resulted in the development of residual soils arranged in a northeast-trending pattern nearly paralleling the pattern formed by sedimentary rocks. Slow gravity movement of soils down slopes has modified the original distribution of residual soils by shifing their boundaries toward the valleys. The alluvial soils are relatively small deposits along streams and show little relation to the trend of sedimentary rocks. (Woodard-USGS)
W74-01146

GROUND-WATER YIELD POTENTIAL IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
W. M. McMaster.
Available from USGS, Washington, D.C. 20242 Price $0.75. Miscellaneous Geoligic Investigations Map I-767 E, 1 sheet, 1973. 1 map, 3 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Mapping, *Tennessee, Water wells, Water yield, Geology, Drilling, Test wells, Geological surveys, Evaluation.
Identifiers: *Knox County (Tenn.).

This one-sheet map folio describes conditions that affect groundwater availability in Knox County, Tennessee. The county is underlain by a variety of consolidated sedimentary rocks, including dolomite, limestone, shale, and sandstone. These rocks are not permeable enough to allow water to move freely through them or porous enough to allow water to be retained within them. There is no direct way to identify the presence of large water-bearing openings other than by drilling, but knowledge of the geology and water-bearing characteristics, probable thickness of saturated weathered material, and topography can be used to delineate areas potentially favorable for large-yield wells. On this basis, and using available well records, this generalized map showing groundwater yield potential for Knox County was prepared. Water-bearing openings are common to depths of 250 feet, less common at depths of 250 to 350 feet, and rare below 350 feet. Although sizable openings have been penetrated by wells at depths of 600 feet or more, few wells obtain significant amounts of water below 350 feet. (Woodard-USGS)
W74-01147

SENSITIVITY OF GROUNDWATER FLOW MODELS TO VERTICAL VARIABILITY OF AQUIFER CONSTANTS,
Oklahoma State Univ., Stillwater. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W74-01151

THE SOVIET DARMS PROGRAM--TWENTY YEARS OF DEVELOPMENT, DEPLOYMENT, AND DATA,
National Science Foundation, Washington, D.C. Office of Polar Programs.
S. M. Olenicoff.
In: Arctic Data Buoys; AIDJEX (Arctic Ice Dynamics Joint Experiment) Bulletin No 22, p 8-34, August 1973. 5 fig, 5 tab, 15 ref.

Descriptors: *Data collections, *Arctic Ocean, *Buoys, Water temperature, Currents (Water), Ocean currents, Ocean circulation, Meteorological data, Hydrologic data, Instrumentation, Telemetry.

Since 1953, the Soviet Arctic and Antarctic Research Institute has been deploying two types of automatic stations on the pack ice of the Arctic Basin: the Alekseyev radio-beacon (for position data only) and the DARMS (Drifting Automatic Radio-Meteorological Station). In recent years, the Soviets have developed and are starting to deploy a more advanced automatic station which will collect hydrological as well as meteorological data. During the past 20 years, approximately 440 automatic stations have been deployed, and they have relayed over 40,000 coordinate determinations and about 150,000 meteorological measurements. These data have been regularly processed, distributed, and utilized to improve weather and ice forecasts for the Arctic regions, particularly during the navigation period along the Northern Sea Route. (Knapp-USGS)
W74-01157

BAROMETRIC PRESSURE MEASUREMENTS FROM BUOYS DURING AIDJEX 1972,
Washington Univ., Seattle.
For primary bibliographic entry see Field 07B.
W74-01159

A RESONANT CAPSULE PRESSURE TRANSDUCER FOR DATA BUOYS,
Kollsman Instrument Corp., Syosset, N.Y.
For primary bibliographic entry see Field 07B.
W74-01160

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM EARTH RESOURCES TECHNOLOGY SATELLITE-1, MARCH 5-9, 1973: VOLUME III--DISCIPLINE SUMMARY REPORTS.

Available from the National Technical Information Service as N73-28405, $8.25 in paper copy, $1.45 in microfiche. National Aeronautics and Space Administration, Goddard Space Flight Center Publication X-650-73-155. S. C. Freden, and E. P. Mercanti, editors, May 1973. 118 p.

Descriptors: *Remote sensing, *Satellites (Artificial), *Data collections, *Data processing, Land use, Surveys, Mapping, Geology, Resources, Water pollution, Air pollution, Oceanography.
Identifiers: *ERTS.

The first Earth Resources Technology Satellite (ERTS-1) was launched on July 23, 1972. In the 7 months since it was activated, over 34,000 scenes of the earth have been obtained, covering all major land masses and about 75% of the world's land area. Some areas, such as the United States, have been imaged at least 12 times. The purpose of the ERTS program is to provide an assessment of remote sensing from a satellite as a technique for inventorying and monitoring the earth's resources to provide for better management of these resources. This symposium provided the first open forum where the users of the ERTS data had the opportunity to present the significant accomplishments from their investigations. It also provided the first opportunity for representatives of federal, state, and local organizations to present their views on how ERTS data are being used and will be used for solving operational resources management problems. The reports of the Working Groups which were convened to summarize and critique the ERTS results in the various disciplines are presented. (See also W73-14126 and W74-01164 thru W74-01171) (Knapp-USGS)
W74-01163

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 03F.
W74-01164

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab.
For primary bibliographic entry see Field 04A.
W74-01165

MINERAL RESOURCES, GEOLOGICAL STRUCTURE AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
N. M. Short.

In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 30-46, May 1973. 2 append.

Descriptors: *Geologic mapping, *Remote sensing, *Satellites (Artificial), Mapping, Data collections, Surveys, Geomorphology, Mining, Exploration, Structural geology, Faults (Geologic), Folds (Geologic), Joints (Geologic), Fractures (Geologic).
Identifiers: *ERTS.

In regions where rock exposures are good because of low vegetation cover, major geologic features such as folds, fault offsets, intrusion outlines, volcanic flows, contacts between rock units, and many landforms can be effectively mapped from ERTS images with details comparable to mapping by conventional methods. Folds and similar structural features are detectable. Success in detection depends on lithologic types and sequence (contrast effects), width of exposed units, topographic expression, size of structure, structural setting, degree of exposure, extent of ground cover, and sun angle. ERTS is effective in bringing to light previously unrecognized circular structures. The most frequently reported achievement from ERTS of direct concern to geology is its ability to detect linear features on the earth's surface. Some of these features are nongeological, such as powerlines, roads, and animal migration routes. Geological linear features include contacts, metamorphic grain, fractures, joints, faults, and lineaments, which can include any of the foregoing structural elements as well as other tectonic features of an indefinite nature. These linar features vary in scale and length from a few kilometers to regional or subcontinental dimensions. In some instances, mines or quarries that were not associated with known structural controls appear to fall on or close to individual linears or intersection points. (See also W74-01163) (Knapp-USGS)
W74-01166

ENVIRONMENT SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 05A.
W74-01167

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
V. V. Salomonson.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1, Vol III, Discipline Summary Reports; Greenbelt, Md., March 5-9, 1973: NASA, Goddard Space Flight Center Publication X-650-73-155, p 57-69, May 1973. 2 append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Water resources, Land use, Snow cover, Glaciers, Data collections, Lakes, Wetlands, Mapping, Water quality, Water pollution, Soil water.
Identifiers: *ERTS.

Various land uses related to water resources management can easily be identified and mapped using ERTS-1 data at a scale of 1:250,000. The sources of water pollution, sediment load sources, and changing water yield can be delineated. ERTS-1 detection of geologic fracture zones and especially intersections of fractures has potential for the development of groundwater resources. Areas inundated by flooding can be mapped at scales of 1:250,000 or larger. The elevations of the snowline can be estimated to the nearest 60 meters. The multispectral repetitive coverage permits observations of medial moraines, unusual glacier surges or movements, snowlines, and other features. Surging glaciers can be distinguished from nonsurging glaciers by their folded moraines. The Data Collection System on ERTS-1 is a reliable and rapid means of collecting and relaying hydrologic data so that they can be used in management situations requiring nearly real-time data. Surface-water bodies as small as 1 hectare in size can be located and rivers as narrow as 70 meters can be easily followed. Reflectance variations are readily observable in water bodies from ERTS-1. These reflectance variations are due largely to variations in depth, suspended sediments, concentrations and pollutants, and biological activity. (See also W74-01163) (Knapp-USGS)
W74-01168

MARINE RESOURCES AND OCEAN SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07B.
W74-01169

INTERPRETATION TECHNIQUES DEVELOPMENT,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07B.
W74-01170

MULTIDISCIPLINARY/REGIONAL RESOURCE SURVEYS,
National Aeronautics and Space Administration, Wallops Island, Va. Wallops Station.
For primary bibliographic entry see Field 07B.
W74-01171

OBJECTIVE REGIONALIZATION OF PEAK FLOW RATES,
Agricultural Research Service, Chickasha Okla. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 04D.
W74-01174

COMPUTER SIMULATION OF ESTUARIAL NETWORKS,
California Univ., Berkeley. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W74-01197

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 4 AND 5. ST LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-01268

AREAS OF POSSIBLE FLOODING IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
L. D. Harris.
For sale by USGS, Washington, DC 20402 - Price $0.75. Miscellaneous Geologic Investigations Map I-767 M, 1 sheet, 1973. 1 map, 5 ref.

Descriptors: *Flood plains, *Regional flood, *Mapping, *Tennessee, Geomorphology, Sinks, Karst, Geological surveys, Flood forecasting, Flood protection, Construction, Design criteria, Flood plain zoning.
Identifiers: *Knox County (Tenn).

Major flooding of the Tennessee, Holston, and French Broad Rivers in Knox County, Tennessee, has not taken place since the construction in 1941 and 1943 of both upstream and downstream reservoirs that regulate the discharge of these rivers. Although frequency and size of floods is now lessened, studies by the Tennessee Valley Authority (1958; 1965) indicate that even with regulation great floods are possible. Because the potential to flood still exists in Knox County, the Tennessee Valley Authority prepared a series of maps, from which this map (scale: 1:125,000) was compiled, delineating the maximum areas that could reasonably be expected to be flooded as a result of a great regional storm. Areas with abundant sinkholes are also shown on the map because they are natural depressions where the potential to flood is great. (See also W74-01270) (Woodard-USGS)
W74-01269

AREAS WITH ABUNDANT SINKHOLES IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
L. D. Harris.
For sale by USGS, Washington, DC 20402 - Price $0.75. Miscellaneous Geologic Investigations Map I-767 F, 1 sheet, 1973. 4 fig, 1 map, 7 ref.

Descriptors: *Sinks, *Karst, *Geologic mapping, *Tennessee, Geological surveys, Geology, Geomorphology, Topography, Caves, Land subsidence, Groundwater movement, Karst hydrology, Land use, Evaluation.
Identifiers: *Knox County (Tenn).

This one-sheet map folio describes the origin of sinkholes and depicts the location of sinkholes in Knox County, Tenn. In these karst areas, the abundance of sinkholes with no external drainage, the probable presence of subsurface cavities with no expression on the surface, and the movement of groundwater controlled by an interconnected system of solution cavities, all combine to form natural conditions that should influence the use of these areas. Common problems characteristically associated with karst areas include differential subsidence, collapse, temporary or permanent flooding in sinkholes, and contamination of groundwater resources. Thus, a knowledge of the potential problems as well as careful planning are required to achieve a balance between land use and the natural drainage systems of the area. (See also W74-01269) (Woodard-USGS)
W74-01270

LINEAR PROGRAMMING AND CHANNEL FLOW IDENTIFICATION,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 08B.
W74-01277

HYDRODYNAMIC MODELING OF TWO--DIMENSIONAL WATERSHED FLOW,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02A.
W74-01278

PROCESSING AND STORAGE OF HYDROMETEOROLOGICAL DATA IN THE ATMOSPHERIC ENVIRONMENT SERVICE,
Atmospheric Environment Service, Toronto (Ontario).
J. Rogalsky, and H. L. Ferguson.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 1-7, 1971. 2 fig, 1 tab, 5 ref.

Descriptors: *Data collections, *Meteorological data, *Canada, *Data processing, *Data storage and retrieval, Hydrologic data, Flood forecasting, Precipitation (Atmospheric), Streamflow forecasting, International Hydrological Decade.

The Atmospheric Environment Service has collected, processed, and preserved Canadian climatic data for more than 100 years. Since 1950 many of the data files have been transcribed to

machine-sensible media. This period has seen a very rapid development of electronic data processing equipment and techniques and this evolution is expected to continue. The AES has accordingly developed adaptable and versatile procedures to keep pace with the changing technology. Data are continually being reexamined for accuracy and subjected to stringent quality controls. The processing system has been designed to provide the optimum service to a wide variety of users of climatological information. Specialized analyses are carried out for particular applications. This paper describes current AES data processing techniques involving climatological variables of particular interest to hydrologists. A summary of AES hydrometeorological data available in published form and various other media is also provided. (Knapp-USGS)
W74-01290

STORAGE AND RETRIEVAL OF GROUNDWATER DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
G. Grove, and R. L. Herr.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 21-25, 1971. 2 fig, 4 ref.

Descriptors: *Hydrologic data, *Data processing, *Data storage and retieval, *Canada, Groundwater, Aquifer characteristics, International Hydrological Decade.

The automated general purpose groundwater data processing system of the Groundwater Subdivision, Inland Waters Branch, Canada, consists of three operational files. The well data file contains data on the construction and instrumentation of the well and data on the hydrogeological properties of the aquifers penetrated by the well. The lithological log for the well is stored on the well log file. The catalog file provides an index of the data contained on the other files. Programming of a hydrograph file is nearing completion. Data from such diverse sources as federal research projects and provincial water well driller's reports are stored using parameter and mnemonic codes. A maximum of 999 mathematical, statistical, and map subroutines can be used by the retrieval system for processing and displaying data. (Knapp-USGS)
W74-01291

ACQUISITION, STORAGE AND PROCESSING OF GLACIER INVENTORY DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
C. S. L. Ommanney.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 27-29, 1971. 4 ref.

Descriptors: *Data collections, *Data processing, *Data storage and retrieval, *Glaciers, *Canada, Mapping, Surveys, International Hydrological Decade.

A proposal to inventory all the glaciers in Canada was included in the Canadian Program for the International Hydrological Decade. Formal guidelines specify the type of data to be collected and the required format. These form the basis of the Canadian glacier inventory program. All the information required for each glacier is coded on one standard data sheet. The basic data is listed in a standard format for keypunching onto four cards. Based on interpretation of aerial photographs the map outlines of each glacier are checked and the constituent parts (accumulation, ablation areas) are color coded. Once the data cards have been verified and a visual check of the data printouts completed, the data is transferred to magnetic tape for storage, analysis, and retrieval. It is estimated that there may be between 70,000 and 100,000 glaciers in Canada covering over 200,000 sq km. (Knapp-USGS)
W74-01292

STORAGE AND PROCESSING OF WATER QUALITY DATA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
R. H. Peters, and A. Demayo.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 31-45, 1971. 12 fig, 2 tab, 3 ref.

Descriptors: *Hydrologic data, *Data processing, *Canada, *Data storage and retrieval, Data collections, Water quality, Statistics, Water chemistry, Water pollution, International Hydrological Decade.

The storage and processing system for water quality data developed by the Water Quality Division, Department of the Environment, Canada, has been operational for 2 years. It is designed to accept chemical, physical, bacteriological, biological, and hydrometric data relevant to water quality for surface waters, groundwaters, wastewaters, and sediments. The free format input and a station numbering system that is designed to uniquely locate any sampling site make input and retrieval from the system specific and flexible. Data input to the system may be made from precoded laboratory forms, standard 80 character coding sheets, or coded magnetic tape from automated field or laboratory instruments. Data reports may be obtained as lists or statistical summaries. The system is being used by four federal and provincial agencies. (Knapp-USGS)
W74-01293

COMPUTER UTILIZATION OF HYDROLOGICAL DATA FOR NORTH NASHWAAKSIS REPRESENTATIVE BASIN,
New Brunswick Univ., Fredericton. Dept. of Civil Engineering.
K. S. Davar, and J. C. Li.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 53-70, 1971. 17 fig.

Descriptors: *Data processing, *Hydrologic data, *Forecasting, Small watersheds, *Canada, Statistics, Mathematical models, Demonstration watersheds, International Hydrological Decade.
Identifiers: *North Nashwaaksis representative basin (Canada).

In planning computer utilization of hydrological data, the choice of methodology must be governed by the objectives, scale, and constraints of the project. Data routing in the study of the North Nashwaaksis Representative Basin, Canada, which has a drainage area of 10.4 square miles is described. The two principal program objectives for this project are: (1) research relating to the hydrological regime in the basin, and (2) data inventory for the representative basin. Experience on this project leads to the clear conclusion that such programs necessitate the employment of trained semipermanent staff as important links in the chain of operations. A major objective of data acquisition in this program is to derive from the long-term accumulative data log an estimate of hydrology on the continental scale. (Knapp-USGS)
W74-01294

DATA ACQUISITION AND STORAGE FOR RESEARCH WATERSHEDS,
Guelph Univ. (Ontario). School of Engineering.
W. T. Dickinson, and G. J. Molnar.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 71-76, 1971. 4 fig, 5 tab.

Descriptors: *Data processing, *Data storage and retrieval, Canada, Small watersheds, Data collections, Rainfall-runoff relationships, Water yield, Runoff forecasting, International Hydrological Decade.

In watershed research, there is a need for a system of acquiring data and transforming them to a stored form suitable for analyses compatible with the research objectives and for reference for other purposes. Factors to be considered in satisfying this need are outlined, and candidate acquisition systems are considered, including both direct and indirect approaches. Comparisons are made between the systems with regard to time, cost, and other factors. Particular attention is given to the recent optical character recognition indirect acquisition methodology. (Knapp-USGS)
W74-01295

PLANNED DATA STORAGE METHODS FOR THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES,
McMaster Univ., Hamilton (Ontario). Center for Applied Research and Engineering Design.
B. H. Nodwell, and J. MacDowall.
In: Computer Storing and Processing of Hydrological Data; Proceedings of Workshop Seminar, 1971, Ottawa, Canada: Canadian National Committee for the International Hydrological Decade, p 81-92, 1971. 8 fig, 1 tab, 2 ref. CARED Contract.

Descriptors: *Data storage and retrieval, *Data processing, *Great Lakes, International Hydrological Decade, Canada, Data collections, Hydrologic data.

A method of storing the data collected during the IFYGL is proposed. The Data Bank consists of a three-level system, the first level being a catalogue; the second, a summarized form of data stored on magnetic tape, hard copy, and microfilm for easy use, access, storage, and transport; the third, detailed unsummarized observations stored on magnetic tape. These data are to be both compact and scientifically useful. Summarization methods and formats that meet these conditions are described for a number of sensor packages, and methods of storage are discussed. Size and cost of the final summarized data bank are estimated along with distribution costs of this level of data. (Knapp-USGS)
W74-01296

EVALUATION OF THE ACCURACY OF GRAN PLOTS BY MEANS OF COMPUTER CALCULATIONS. APPLICATION TO THE POTENTIOMETRIC TITRATION OF THE TOTAL ALKALINITY AND CARBONATE CONTENT IN SEA WATER,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W74-01365

CLIMATOLOGICAL STATIONS IN CALIFORNIA, 1971,
California State Dept. of Water Resources, Sacramento.
J. D. Goodridge.
Available from State of Calif, Documents Section, P. O. Box 20191, Sacramento, Calif 95820 Price $2.50. California Department of Water Resources Bulletin No 165, July 1971. 114 p, 3 plate.

Descriptors: *Climatic data, *Meteorological data, *Rain gages, *California, Measurement, Data collections, Rainfall, Sites, Temperature, Evaporation, Networks, Indexing, Oregon, Nevada, Arizona, Mexico.

This issue of the 'Index of Climatological Stations in California' is a compilation of 6,352 weather stations in California in 1971 engaged chiefly in measuring rainfall. It also includes some stations situated in Oregon, Nevada, and Arizona, and in the states of Baja California and Sonora in Mexico. Some of these stations also report other types of data, such as temperature and evaporation. The information presented in the index results from the cooperative effort of 90 agencies whose records are listed. (Woodard-USGS)
W74-01383

COMPUTER IDENTIFICATION OF BACTERIA ON THE BASIS OF THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERNS,
National Institutes of Health, Bethesda, Md. Clinical Pathology Dept.
For primary bibliographic entry see Field 05A.
W74-01443

EXTENDED TABLES FOR KENDALL'S TAU,
Commonwealth Scientific and Industrial Research Organization, North Ryde (Australia).
D. J. Best.
Biometrika, Vol 60, No 2, p 429-430, August 1973. 2 tab, 5 ref.

Descriptors: *Regression analysis, Statistical methods.
Identifiers: *Kendall's tau, *Normal approximation, *Errors, Rank correlation coefficient, Ties, Normal distribution.

Tables for testing the significance of Kendall's tau without ties have been extended beyond n less than or equal to 40 to n equals 100. This permits study of the errors involved in the use of the normal distribution, previously the only way of testing significance tests has also been studied and existing tables for ties in one ranking extended beyond n equals 10. (Little-Battelle)
W74-01497

DON'T FORGET D/A CONVERTER TEMPCO,
Burr-Brown Research Corp., Tucson, Ariz.
C. R. Teeple.
Electronic Design, Vol 21, No 9, p 130-132, April 26, 1973. 4 fig.

Descriptors: Temperature, Electronic equipment.
Identifiers: *Accuracy, *Errors, *Digital to analog converters, *Analog to digital converters.

Accuracy drift of digital to analog and analog to digital converters occurs when temperature fluctuates and results from offset drift, gain drift, and linearity error. To assure system accuracy, the converter must function in a satisfactory temperature range. If converter resolution is known, the temperature range to confine errors to plus or minus 1 LSB can be obtained from an included graph. The graph can also be used to determine converter drift. (Little-Battelle)
W74-01507

USING COMPUTERS TO ANALYZE CONTINUOUS DATA,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. J. Catherines, S. A. Clevenson, and H. F. Scholl.
Instruments and Control Systems, Vol 46, No 9, p 83-85, September 1973. 7 fig, 2 ref.

Descriptors: *Data processing, *Computer programs, Statistical methods, Data storage and retrieval, Computers, Electronic equipment.
Identifiers: *Data acquisition, *Recorders, Data interpretation.

Continuous data on vertical, longitudinal, and lateral accelerations of railroad cars and vibrations of STOC aircraft were recorded by one of two systems. In the first, transducer outputs were applied to voltage-controlled oscillators to produce frequencies corresponding to IRIG standards. These outputs were multiplexed with a 12.5 kHz reference and recorded on one track of a stereo tape recorder. In the second system, transducer outputs were recorded on a 7-channel FM recorder. The data were re-recorded in the laboratory in wide-band FM form with 6.75 kHz carrier frequency and continuous time code. A general-purpose time series analysis program was used to process and analyze the data by computer and provide autocorrelations, cross correlations, power spectral densities, histograms, standard deviations, mean values, maximum magnitudes, rms levels, and transfer functions. An exceedance program computed the number of times and period during which the signal exceeded a specified level. Power spectral density curves identified dominant frequencies. (Little-Battelle)
W74-01520

HYDROLOGICAL INFORMATION FOR THE PLANNING OF WATER RESOURCES IN DEVELOPING COUNTRIES (L'INFORMATION HYDROLOGIQUE POUR LA PLANIFICATION DES RESOURCES HYDRAULIQUES DANS LES PAYS EN VOIE DE DEVELOPPEMENT),
Office de la Recherche Scientifique et Technique OUtre-Mer, Paris (France).
J. A. Rodier.
Paper presented at International Symposium on Water Resources Planning, Mexico City, December 1972, 16 p.

Descriptors: *Data collections, *Basic data collections, *Hydrologic data, Investigations, Sampling, Groundwater resources, Groundwater availability, Surface waters, Surface water availability, Appraisals, Resources, Water resources, Groundwater resources, Water quality, Pollutants.
Identifiers: *Developing countries (West Africa), *Africa.

Twenty-five years of hydrologic investigative experience acquired by the French Hydrologic Service in what was once all French colonial Africa is used to demonstrate the requirements of data collection for planning in developing countries which are short of water. Studies were conducted with emphasis on sourface water resources, groundwater resources, and waters threatened by pollution, overusage, or other imposed stresses. Hydrologic data collection programs must be designed with definite planning data uses defined, either for present or future development considerations. If such uses are not considered, insufficient and unplanned data will force regions into slow realization of development. Initially a program should be designed to offer short term data to answer immediate questions concerning water resources problems. As the country develops, schemes to acquire data for long range planning objectives can be incorporated into large scale regional planning objective analysis. (Muller-Arizona)
W74-01623

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME 2. HYDROLOGIC DATA MANAGEMENT,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
For primary bibliographic entry see Field 02E.
W74-01642

COMPUTER IDENTIFICATION OF YEASTS OF THE GENUS SACCHAROMYCES,
Heroit-Watt Univ., (Soctland). Dept. of Brewing and Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-01646

08. ENGINEERING WORKS

8A. Structures

SOUTH AMERICAN MARINE ENERGY,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
R. J. Russell.
Available from NTIS as AD-700 259, $6.00 in paper copy, $1.45 in microfiche. Technical Report No 73, December 1, 1969. 40 p, 2 fig, 31 tab. ONR Nonr-1575 (03).

Descriptors: *Coastal engineering, Geomorphology, Topography, Tides, Energy, *Waves (Water), *Engineering structures, Sea level, South America.
Identifiers: Sea state, Swell.

The report summarizes information needed by geomorphologists concerned with explaining coastal features or by engineers designing structures exposed to physical attack by the sea. Summaries of tidal ranges, state of the sea, swell characteristics, and comments on wave energy are based on tables prepared by the Coast and Geodetic Survey (ESSA), the Navy Hydrographic Office, and Army Engineering Research and Development Laboratories. Suggestions are included designating parts of the coast where effects of sea and swell may be differentiated, but no morphological forms are discussed. The active physical processes involved in changing coasts tabulated here are to be used along with knowledge of passive factors, such as lithology and topography, for explaining coastal forms or for purposes of engineering design. (Sinha-OEIS)
W74-01181

MOHAWK LAKE STUDY, BRANTFORD, ONTARIO.
For primary bibliographic entry see Field 02J.
W74-01476

TRI-AGENCIES PIPELINE: ENGINEERING REPORT.
San Diego County Water Authority, Calif.

February, 1972. 13p, 5 fig, 2 tab, 6 ref, 3 append.

Descriptors: *Pipelines, *Water supply, *Water distribution (Applied), Aqueducts, *California, Water districts, Inter-agency cooperation.
Identifiers: *San Diego County (Calif), Hydraulic gradient, Back-feeding.

Three public agencies in San Diego County, California, the City of Oceanside, Carlsbad Municipal Water District, and the Vista Irrigation District, proposed a single pipeline to convey water to themselves from the Second San Diego Aqueducts. A County Water Authority study concluded that substantial savings totaling $1,088,000 would be realized if the three agencies cooperated in construction of the single pipeline, rather than building separate lines. Additionally, maintenance costs and environmental damage would be less. Also future water needs of the participating agencies would be sufficient to require additional aqueduct service connection capacity for each agency within 3 to 5 years. Four routes were developed for the pipeline, only one of which was selected for presentation herein. The proposed pipeline would be provided at a hydraulic gradient considerably above the elevation of that required within the service area. It will allow the present Vista and Oceanside water systems to be backfed, which means that those existing supply networks will be adequate for much longer periods. Much of the added demand for water in all three agencies' service districts has occurred at high elevations at extreme ends of those systems, making maintenance of heads difficult. The pipeline will facilitate storage of water in reservoirs along

its route for later use at peak demand periods. Pumping does not appear necessary except when water is being placed in higher reservoirs. Diameters of the pipeline will range from 42 to 18 inches. Appendices include recommended design criteria and standards for the pipeline, engineering maps and diagrams of the pipeline, and a proposed form of a "joint powers" agreement between the three agencies. (Stein-North Carolina)
W74-01477

8B. Hydraulics

OBSERVATIONS AND EXPERIMENTS ON SOLITARY WAVE DEFORMATION,
Stanford Univ., Calif. Dept. of Civil Engineering.
R. L. Street, and F. E. Camfield.
Available from NTIS as AD-645 086, Paper copy $6.00, Microfiche $1.45. Technical Note No. 85 (1)-66, December 1966. 25 p, 7 fig, 18 ref. Nonr 225 (85), NR089-041.

Descriptors: *Coasts, *Beaches, *Waves (Water), deformation, Shallow water, Slopes, Sea walls, Engineering structures.
Identifiers: Solitary waves, *Shoaling.

A series of experiments were run in a two-dimensional wave channel to study solitary wave deformation on plane slopes ranging from horizontal to vertical. The test objectives included verification of deformation theories, delination of the shoaling processes associated with various slopes, and examination of the limit-height-wave concept. The results showed that the deformation process can be classified as a function of the ratio of initial wave height to water depth and beach slopes. The deformation theory for reflection from a vertical wall was verified, but the theory for low slopes was found to be only qualitatively accurate. Finally, a redefinition of the limit-height wave on sloping beaches is suggested. (Sinha-OEIS)
W74-01215

FLOW VISUALIZATION IN FREE SHEAR LAYERS,
Hong Kong Univ. Dept. of Mechanical Engineering.
J. A. Clark, and E. Markland.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10119, p 1897-1913, November 1973. 7 fig, 2 tab, 19 ref, append.

Descriptors: *Turbulent flow, *Vortices, *Jets, *Turbulent boundary layers, Turbulence, Boundary layers, Transition flow, Hydraulics, Hydrodynamics.

The laminar-turbulent transition of the free shear layer in two-dimensional wall jets was studied. Detailed information on vortex formation was provided by visualization in water using the hydrogen bubble technique. The observed vortex structures in the shear layer during transition are dominated by transverse elements which grow exponentially as they travel downstream. Longitudinal parts are also apparent giving rise to three-dimensional flow in the shear layer. Further downstream the vortices break down three-dimensionally, creating the onset of turbulence. (Knapp-USGS)
W74-01271

A ROLE OF SEDIMENT TRANSPORT IN ALLUVIAL CHANNELS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02J.
W74-01272

ANALYSIS OF SEDIMENT SORTING IN ALLUVIAL CHANNELS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02J.
W74-01274

NUMERICAL SOLUTION OF MULTIPHASE WELL FLOW,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Ground-Water Hydrology.
W. Brutsaert.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10162, p 1981-2001, November 1973. 4 fig, 16 ref, append.

Descriptors: *Groundwater movement, *Water wells, *Drawdown, *Oil wells, Mathematical models, Finite element analysis, Simulation analysis, Porous media, Oil-Water interfaces.
Identifiers: *Multiphase flow.

A method is presented for numerically solving immiscible multiphase well flow considering three compressible fluids, two liquids, and one gas, and assuming isothermal conditions. Capillary and dissolution of gas in liquid are considered in the proposed mathematical model. Numerical difficulties arising from the nonlinearity of the equations and from the finite differencing in cylindrical coordinates are easily dealt with by using a modified Newton method to solve the fully implicit finite difference equations. Coning problems in the petroleum industry and unconfined flow problems in hydrology are typical applications. (Knapp-USGS)
W74-01275

BOUNDARY CONTRACTIONS AS CONTROLS IN TWO-LAYER FLOWS,
California Univ., Los Angeles. School of Engineering and Applied Science.
S. C. Mehrotra.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10160, p 2003-2012, November 1973. 2 fig, 8 ref, append. NSF Grant GA-31247.

Descriptors: *Stratified flow, *Flow control, Flow characteristics, Hydraulics, Flow around objects, Open channel flow.
Identifiers: *Flow contractions.

Two-layer flows past contractions may be calculated using a vector-matrix equation. The steady problem can be reduced to a set of two equations, a detailed study of which reveals the correspondence and noncorrespondence between the two types of contractions. For two-layer flows with bounded upper layer, only the section where the contraction is the severest can act as a control. When the upper layer is free, this is true only with regard to vertical obstructions. Two-layer flows past horizontal contractions with free upper layer can be controlled at two sections--one at the throat and the other away from it. However, when the flow throughout is subcritical with respect to the free surface wave mode (a common situation), vertical and horizontal contractions are equivalent, the only control being at the severest section. (Knapp-USGS)
W74-01276

LINEAR PROGRAMMING AND CHANNEL FLOW IDENTIFICATION,
California Univ., Los Angeles. Dept. of Engineering Systems.
W. W.-G. Yeh, and L. Becker.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 99, No HY11, Paper 10177, p 2013-2021, November 1973. 1 fig, 2 tab, 12 ref, append.

Descriptors: *Open channel flow, *Linear programming, Mathematical models, Hydraulics, Optimization, Parametric hydrology, Unsteady flow.

A method was developed for the optimal identification of parameters in unsteady open channel flow. The parameters chosen for identification are two constants embedded in the generalized friction slope expression which encompasses both the Manning and Chezy equations. A minimax error criterion was formulated and solutions are obtained by the use of the influence coefficient algorithm and linear programming. The required information is a set of concurrent input and output measurements and appropriate initial and boundary conditions of the system. Numerical results demonstrate the efficiency of the formulation and the rapidity of the rate of convergence. (Knapp-USGS)
W74-01277

SEDIMENT TRANSPORT: NEW APPROACH AND ANALYSIS,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 02J.
W74-01279

OXNARD BASIN EXPERIMENTAL EXTRACTION-TYPE BARRIER,
California State Dept. of Water Resources, Sacramento.
G. Torres, Jr., and P. J. Yates.
Available from Office of Procurement, Documents Section, P. O. Box 20191, Sacramento, Calif., 95820 Price $3.00. Bulletin No 147-6, September 1970. 157 p, 12 fig, 3 tab, 6 ref, 12 append.

Descriptors: *Water pollution control, *Saline water intrusion, *Sea water, *Aquifers, *California, Water wells, Pumping, Groundwater recharge, Rainfall, Water quality control, Water resources development, Groundwater barriers, Groundwater movement.
Identifiers: *Ventura County (Calif), Extraction-type barrier.

An experimental extraction-type barrier was constructed along approximately 2,600 feet of coastline near the city of Port Hueneme in Ventura County, California, to determine the hydraulic feasibility of creating a pressure trough in a confined aquifer by means of extraction wells, and the effectiveness of such a trough in preventing seawater intrusion. Five extraction wells, each with a pumping capacity of 1,100 gpm, and a discharge pipeline were installed by the Department of Water Resources and operated for 2 years by the United Water Conservation District. During the field test, 9,000 acre-feet of degraded water was extracted. This extraction, combined with 2 years of above normal rainfall, reduced the areal extent affected by intruded water from 6,100 to 4,800 acres. Operation of the experimental barrier section demonstrated the hydraulic feasibility of this method of controlling seawater intrusion. Approximate costs per mile of barrier and needed well spacing and capacity for a full-scale barrier were developed; however, additional information on the extent and transmissibility of the aquifers to be protected would be required to permit final selection of the spacing and capacity of extraction wells. The use of noncorrosive materials, rather than a cathodic protection system, was also found advisable. (Woodard-USGS)
W74-01289

TURBULENT FLUID FRICTION OF ROTATING DISKS,
Case Western Reserve Univ., Cleveland, Ohio.
For primary bibliographic entry see Field 08C.
W74-01640

8C. Hydraulic Machinery

TURBULENT FLUID FRICTION OF ROTATING DISKS,
Case Western Reserve Univ., Cleveland, Ohio.
P. Cooper.

Available from NTIS, Springfield, Va. 22151, NASA CR-2274 Price $6.00 printed copy; $1.45 microfiche. National Aeronautics and Space Administration Contractor Report NASA CR-2274, July 1973. 340 p, 75 fig, 5 tab, 42 ref, 7 append. NASA NGL 36-003-139.

Descriptors: *Fluid mechanics, *Rotational flow, *Pumps, *Fluid friction, *Turbulent boundary layers, Model studies, Methodology, Numerical analysis, Correlation analysis, Reynolds number, Turbulent flow, Hydraulic equipment, Viscosity.
Identifiers: Rotating disk.

The incompressible flow field between two infinite parallel disks, one of them rotating and the other stationary, is analyzed and solved for situations where the radial Reynolds number Re±wr square/v (w)disk angular speed; r±radius from axia to rotation and v±kinematic viscosity of the fluid) is large enough to produce turbulent flow. An effective viscosity method is used, the effective viscosity being regarded as a scalar. Hence the stresses for both the laminar and turbulent regimes are in the direction of the local velocity gradient. The validity of such an approach is demonstrated for the case of boundary layer development on a rotating disk in an infinite fluid otherwise at rest. An implicit finite-difference method is used to obtain a numerical solution of the boundary layer flow from the axis out to a radius corresponding to Re±10 to the 7th power. For an assumed transition from laminar to turbulent flow at the experimentally observed value of Re±3x100,000, the resulting skewed velocity profiles and disk friction drag agree well with measurements. Also solved by the same numerical technique is the case of the surrounding fluid rotating at one-half the disk speed. (Woodard-USGS).
W74-01640

8D. Soil Mechanics

STRATIGRAPHY AND ECONOMIC GEOLOGY OF THE COASTAL PLAIN OF THE CENTRAL SAVANNAH RIVER AREA, GEORGIA,
Georgia Univ., Athens. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-01122

ENGINEERING CHARACTERISTICS OF OVERBURDEN IN KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01143

8E. Rock Mechanics and Geology

OVERBURDEN RELATED TO TYPE OF BEDROCK AND ENGINEERING CHARACTERISTICS OF THE BEDROCK, KNOX COUNTY, TENNESSEE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01144

8I. Fisheries Engineering

GREATER ADAPTABILITY OF FRESHWATER MUSSELS TO NATURAL RATHER THAN TO ARTIFICIAL DISPLACEMENT,
Bureau of Sport Fisheries and Wildlife, Washington, D.C. Office of Endangered Species.
M. J. Imlay.
Nautilus. Vol 86, No 2-4, p 76-79. 1972.
Identifiers: Adaptability, *Artifical displacement, Fishery, *Mussels (Fresh water).

Artificial displacement of freshwater mussels in the stream bottom (substrate smothering, commercial harvesting, or removal and replacement) was determined to harm mussels more often than was natural displacement (natural sand formation, storm disturbance, etc.). A biological explanation is presented that contributes to understanding why water projects (dredging, channelization, impoundments, quarry washing) are so devastating to freshwater mussels.--Copyright 1973, Biological Abstracts, Inc.
W74-01235

MONITORING CHANNEL CATFISH USE OF A DEMAND FEEDER,
Bureau of Sport Fisheries and Wildlife, Stuttgart, Ark. Fish Farming Experiment Station.
W. H. Hastings, B. Hinson, D. Tackett, and B. Simco.
Prog Fish-Cult. Vol 34, No 4, p 204-206. 1972. Illus.
Identifiers: *Channel catfish, *Monitoring, Demand feeders (Fish), *Fish food.

A mechanism is described that permits the continuous monitoring of time intervals that feed leaves a demand feeder. Data collected from the use of this mechanism suggest that catfish fingerlings feed more frequently during the afternoon hours of the summer months and at a daily rate of about 4% of their body weight. Winter feeding with large catfish occurs at fairly regular intervals throughout the day and at a daily rate of about 1-1/4% of their body weight.--Copyright 1973, Biological Abstracts, Inc.
W74-01237

SUPERSATURATION OF NITROGEN IN WATER DURING PASSAGE THROUGH HYDROELECTRIC TURBINES AT MACTAQUAC DAM,
Environmental Protection Service, Halifax (Nova Scotia).
For primary bibliographic entry see Field 05C.
W74-01432

RELIABILITY OF AN AMMONIA PROBE FOR ELECTROMETRIC DETERMINATION OF TOTAL AMMONIA NITROGEN IN FISH TANKS,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inti.
For primary bibliographic entry see Field 05A.
W74-01433

INCREASE OF RESISTANCE OF CARP TO DROPSY BY MEANS OF BREEDING. II. COURSE OF SELECTION AND EVALUATION OF THE BREED GROUPS, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
For primary bibliographic entry see Field 05C.
W74-01560

FISHERIES AND FISH CULTURE IN ISRAEL IN 1971,
Laboratory for Research Fis. Dis., Nir David (Israel).
For primary bibliographic entry see Field 06B.
W74-01570

FURTHER STUDIES OF FISH PREDATION ON SALMON STOCKED IN MAINE LAKES,
Maine Dept. of Inland Fisheries and Game, Bangor.
For primary bibliographic entry see Field 02H.
W74-01603

09. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

GRADUATE COURSES RELATED TO WATER RESOURCES.
Massachusetts Univ., Amherst. Water Resources Research Center.

Available from the National Technical Information Service as PB-225 115/5, $2.75 in paper copy, $1.45 in microfiche. 1972. 17 p. OWRR A-999-MASS (10).

Descriptors: *Training, Water resources, *Universities, *Massachusetts, *Education, Facilities, Water Resources Research Act, *Water Resources Insitutute.
Identifiers: *Graduate courses, Water resources-related courses, Course listing.

This listing of 104 graduate courses (in 19 Departments) related to water resources offered at the University of Massachusetts in Amherst, was prepared in response to the large number of requests for this type of information directed to the University's Water Resources Research Center. Several new courses are added each year. (Woodard-USGS)
W74-01119

THE ROLE OF UNIVERSITIES IN WATER RESOURCES EDUCATION: THE SOCIAL SCIENCES,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 06B.
W74-01467

EDUCATIONAL PROGRAMS FOR LAND AND WATER RESOURCES DEVELOPMENT AND MANAGEMENT,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 06B.
W74-01628

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

OCEAN UTILIZATION AND COASTAL ZONE DEVELOPMENT.
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 02L.
W74-01281

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Biodegradation of O-Benzyl-P-Chlorophenol,
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Report on Laurel Creek Channel Improvements, Waterloo and Bridgeport, Ontario.
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Tidewater Shorelines in Broward and Palm Beach Counties, Florida: An Analysis of Characteristics and Changes Interpreted from Color, Color Infrared and Thermal Aerial Imagery,
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
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VOLUME 7, NUMBER 4
FEBRUARY 15, 1974

W74-01651 -- W74-02150

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

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Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

02. WATER CYCLE

2A. General

ESTIMATING THE LAND SLOPE OF MOUNTAIN WATERSHEDS,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
N. Bethlahmy.
Journal of Soil and Water Conservation, Vol 28, No 5, p 229-230, September - October 1973. 2 fig, 2 tab, 3 ref.

Descriptors: *Terrain analysis, *Topography, *Slopes, Geomorphology, Rainfall-runoff relationships, Water ballance, Maps, Mapping, *Watersheds (basins).
Identifiers: *Mountain watersheds.

Land slope is one of many elements that affect a watershed's regime. Its effect is particularly significant in mountainous areas, solar heat input. Solar heat controls the rate of snowmelt as well as evapotranspiration. The average land slope of watershed can be determined by detailed analysis of a contour map. If only a planimetric map is available, a method is given that will result in land slope values that approximate closely those obtained from analyses of contour maps. The basis for this method is the relation between the length of a mountain stream and the circumference of its watershed. An empirical equation is given to satisfy both the theoretical constraints and the requirements of data that characterize mountainous watersheds formed by fluvial erosion. The results of using this equation on data for mountain watersheds in Idaho were compared with the results from an analysis of a contour map. The correlation coefficient of the compared values is 0.93 (significant at the 1% level). (Knapp-USGS)
W74-01715

CONCEPTUAL MODELS: 2. FLUVIAL-ALLUVIAL, GLACIAL, LACUSTRINE, DESERT, AND SHOREZONE (BAR-BEACH-DUNE-CHENIER) SEDIMENTARY ENVIRONMENTS,
Laurentian Univ., Sudbury (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-01940

PALEOHYDROLOGIC IMPLICATIONS OF SOME PLUVIAL LAKES IN NORTHWESTERN NEW SOUTH WALES, AUSTRALIA,
Wisconsin Univ., Milwaukee. Dept. of Geography.
For primary bibliographic entry see Field 02H.
W74-01959

THE SIMULATION OF SUBSURFACE EFFECTS ON THE DIURNAL SURFACE THERMAL REGIME IN COLD REGIONS,
Michigan Univ., Ann Arbor. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W74-01988

AQUATIC AND ATMOSPHERIC SIMULATION,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W74-02003

HYDROLOGIC REPORT LITTLE CALUMET RIVER AND TRIBUTARIES, PART I.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 02E.
W74-02127

2B. Precipitation

RADAR INVESTIGATION OF SUMMERTIME LAND/LAKE RAINFALL VARIATIONS OVER LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Dept. of Geography.
J. F. Chandik, and W. A. Lyons.
Available from the National Technical Information Service as PB-225 430/8, $3.50 in paper copy; $1.45 in microfiche. University of Wisconsin Water Resources Center, Madison, Technical Report, WIS WRC 73-10, 1973. 53 p, 19 fig, 1 tab, 29 ref. OWRR A-036-WIS (1), 14-31-0001-3550.

Descriptors: *Rainfall intensity, Atmosphere, *Radar, Climatology, *Air masses, *Lake Michigan, Climatic data, *Precipitation (Atmospheric).

A detailed analysis of gain-stepped WSR-57 radar data shows that warm season precipitation patterns over the southern basin of Lake Michigan (based on areal echo frequency distributions) are on the whole unaffected by the presence of a large cold water body. While precipitation echo frequencies associated with air mass shower activity are 13% lower over the lake compared to those over the land portion of the basin, air mass precipitation accounts for less than 10% of all warm season precipitation over the lake portion of the southern Lake Michigan basin. However, when radar echoes for all warm season precipitation types, e.g., cold front, squall line, and overrunning are investigated, overlake echo counts are slightly greater than land echo counts for comparative land and lake test areas Regions of maximum echo occurrence within 100 n. mi. of Chicago show a persistent orientation similar to climatologically estimated isohyetal patterns for a non-lake effected situation. A hint of increased echo frequencies northeast of the Chicago-Gary industrial complex suggests further studies to ascertain the possiblity of inadvertent weather modification.
W74-01661

ESTIMATION OF THE BACKGROUND CONTAMINATION OF THE ATMOSPHERE FROM THE CHEMICAL COMPOSITION OF PRECIPITATION,
Main Geophysical Observatory, Leningrad (USSR).
For primary bibliographic entry see Field 05A.
W74-01769

CLIMATE AND GRASSLANDS IN SOUTH AMERICA, (IN SPANISH),
J. Blydenstein.
Turrialba. Vol 22, No 3, p 258-262. 1972, Illus. (English summary).
Identifiers: Argentina, Brazil, *Climate, Forage, *Grasslands, Livestock, Production, Venezuela, *South America.

A climatic classification related to dry seasons was developed, calculating the total precipitation during the 3 driest months and the percentage of the total precipitation which falls during the 3 driest and 3 wettest months. The climate of the tropical savanna regions has many semi-arid characteristics, with their consequent limitatiions to production of forage. The most productive livestock regions in South America are the humid temperate areas, such as the Argentine Pampa, with no well-defined dry season and mild winters. The areas which come closest to this situation are located in the humid tropics, such as the area south of Lake Maracaibo in Venezuela or the Amazon basin in Brazil.--Copyright 1973, Biological Abstracts, Inc.
W74-01781

LIDAR EVALUATION OF FOG DISSIPATION TECHNIQUES,
Stanford Research Inst., Menlo Park, Calif.
W Viezee, J. Oblanas, and R. T. H. Collis.
Available from NTIS, Springfield, Va 22151 AD-758 767 Price $5.45. Final Contract Report to Air Force Cambridge Research Laboratories (AFCRL-TR-73-0052), February 1973. 116 p, 19 fig, 1 tab, 7 ref, append. AFCRL Contract F19628-72-C-0018.

Descriptors: *Weather modification, *Fog, *California, Methodology, Heat, Propane, Data collections, Testing procedures, Evaluation, Aircraft, Meteorology.
Identifiers: *Fog dispersal experiments.

During July 1972, laser radar (lidar) observations were made in support of a thermal fog dissipation program conducted by the Air Force at Vandenberg AFB. The program was designed to test the merging heat plume concept as a practical and efficient method of warm-fog dispersal. The ground-based heating system consisted of 213 liquid propane burners arranged in four lines perpendicular to the prevailing wind direction. The heat tests, conducted whenever fog reduced the horizontal visibility to less than 1/2 mile (800 m), consisted of lighting various rows of burners at various burner intensities and spacings under various meteorological conditions (primarily wind speed variations). Profiles of atmospheric backscatter vs. range were observed with a ruby lidar at a point downwind from the ground-based heating system by firing every three seconds while scanning in a vertical plane normal to the wind. Lidar data were collected during conditions of dense, natural fog and during conditions when merging heat plumes interacted with the fog to produce large increases in visibility. The lidar data are analyzed in terms of digital cross sections of visual range that provide information on the intensity and spatial extent of the clearings produced by the heating system. (Woodard-USGS)
W74-01888

2C. Snow, Ice, and Frost

SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND--PRELIMINARY RESULTS FROM ANALYSIS OF MSS IMAGERY,
Geological Survey, Reston, Va. EROS Program Office.
R. S. Williams, Jr., A. Bodvarsson, S. Fridriksson, and G. Palmason.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 317-127, 1973. 3 fig, 14 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geomorphology, *Geologic mapping, Terrain analysis, Valcanoes, Surveys, Glaciers, Glaciation, Sediments, Sedimentation, Erosion, Glacial drift, Coasts, Data collections, Environmental effects, Snow cover, Mapping, Monitoring.
Identifiers: ERTS, *Iceland.

A multidisciplinary research effort in Iceland is directed at an analysis of MSS imagery from ERTS-1 to study a variety of geologic, hydrologic, oceanographic, and agricultural phenomena. Recent lava flows can be delineated from older flows at Askja and Kela. MSS imagery and VHRR visible and infrared imagery recorded the volcanic eruption on Heimaey, Vestmann Islands. Coastline changes, particularly changes in the position of bars and beaches along the south coast, are mappable. Areas covered with new and residual snow can be mapped. Sediment plumes from the discharge of glacial rivers along the south coast can be delineated. Changes in position of rivers, changes in size of lakes, and the occurance of new

lakes may be mapped. Low sun-angle imagery, particularly of snow-covered terrain, markedly enhances the morphologic expression of constructional glacial and volcanic landforms. MSS color composites permit regional mapping of the gross distribution of vegetation. ERTS-1 imagery provides a means of updating various types of maps and will permit the compilation of special maps specifically aimed at dynamic environmental phenomena. (See also W74-01633) (Knapp-USGS)
W74-01699

PRELIMINARY ASSESSMENT OF GEOLOGICAL APPLICATIONS OF ERTS-1 IMAGERY FROM SELECTED AREAS OF THE CANADIAN ARTIC,
Gregory Geoscience Ltd., Ottawa (Ontario).
A. F. Gregory.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 329-343, 1973. 8 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Canada, Structural geology, Exploration, Geology, Data collections, Aerial photography, Surveys.
Identifiers: ERTS.

One immediate benefit from ERTS is improved efficiency in planning for and operation of programs of regional geological mapping, Images were acquired under both summer and early winter conditions in two areas of the Canadian Arctic. Thin snow cover suppresses terrain noise from vegetation, soils, rocks and water and thus presents a uniformly reflective surface with irregularities that have geological and geomorphological significance. Low inclination of the sun accentuates textural patterns and surface irregularities with shadowing analogous to side-looking radar. In conjunction, these two conditions of early winter serve to emphasize structure, relief, and texture of the terrain surface. Where such features reflect rock type, geological formations may be broadly classified and their boundaries delineated. Summer imagery serves to delineate soil-vegetation complexes and the boundaries of water bodies more precisely than winter imagery. Immediate benefits can be achieved by simple interpretation of ERTS images to provide information about the structure and disposition of geological formations. (See also W74-01633) (Knapp-USGS)
W74-01700

EXPLOITATION OF ERTS-1 IMAGERY UTILIZING SNOW ENHANCEMENT TECHNIQUES,
Earth Satellite Corp., Washington, D.C.
F. J. Wobber, and K. R. Martin.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellites-1: Vol I--Technical Presentation, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 345-351, 1973. 1 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Terrain analysis, *Snow cover, *Geologic mapping, Structural geology, Topography, Geomorphology, Data collections, Data processing.
Identifiers: ERTS.

Photogeological analyses of ERTS-1 imagery of snow-covered terrain within the ERAP Feather River site and within the New England test area provide new fracture detail which does not appear on available geological maps. Comparative analysis of snow-free ERTS-1 images demonstrates that MSS Bands 5 and 7 supply the greatest amount of geological fracture detail. A heavy blanket of snow (9 inches) accentuates major structural features, while light snow (1 inch) accentuates more suble topographic expressions. The technique of snow enhancement appears to afford a simple (and no-cost) means of edge enhancement during the snow-covered periods. Increased tonal contrasts along the snow-covered/snow-free interface provide a form of natural edge enhancement for low resolution imagery. Monitoring variation in snow melting and accumulation can supply unique fracture data unavailable during other seasons. (See also W74-01663) (Knapp-USGS)
W74-01701

GLACIATION OF NORTHERN WYOMING INTERPRETED FROM ERTS-1,
Wyoming Univ., Laramie. Dept. of Geology.
R. M. Breckenridge.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 363-369, 1973. 2 fig, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Glaciation, *Wyoming, Geomorphology, Geologic mapping, Topography, Terrain analysis, Data collections, Data processing, Snow cover, Snowpacks, Glaciers.
Identifiers: ERTS.

Using ERTS imagery, a number of alpine glacial features can be recognized and mapped successfully. Although the Wyoming mountains are generally regarded as the type locality for Rocky Mountain glaciation some areas have not been studied from a glacial standpoint because of inaccessibility or lack of topographic control. ERTS imagery provides an excellent base for this type of regional geomorphic study. A map of maximum extent of Wisconsin ice, flow directions, and major glacial features was compiled from interpretation of the ERTS imagery. Features which can be mapped are large moraines, outwash fans, and terraces. Erosional ice features including cirques, large scale grooves, U-shaped valleys, and glacial lakes are useful in delineating glaciated areas. Present-day glaciers and snowfields are easily discriminated and mapped. ERTS provides a quick and effective method for detection of changes and inventory of these vital resources. (See also W74-01663) (Knapp-USGS)
W74-01703

NORTH LOOKS AT WASTE WATER CLEANUP NEEDS.
For primary bibliographic entry see Field 05D.
W74-01868

FLOW NEAR THE MARGIN OF THE BARNES ICE CAP, AND THE DEVELOPMENT OF ICE-CORED MORAINES,
Minnesota Univ., Minneapolis. Dept. of Geology and Geophysics.
R. LeB. Hooke.
Geological Society of America Bulletin, Vol 84, No 12, p 3929-3948, December 1973. 9 fig, 1 tab, 26 ref. NSF Grant GA-19310.

Descriptors: *Glaciers, *Glacial drift, Arctic, *Canada, Glaciation, Sediment transport, Movement, Rheology, Regimen.
Identifiers: *Barnes Ice Cap, Baffin Island, *Ice-cored moraines.

A wedge of deformed superimposed ice is present beneath glacial ice at the margin of the Barnes Ice Cap, Baffin Island, Canada. Where the glacial ice contains debris, the contact between the two is marked by a ridge-shaped ice-cored maraine, 100 to 150 m from the margin. Where the glacial ice contains little or no debris, the surface profile is smooth and convex upward. Measurements of surface flow and ablation rates on both types of margins suggest that a general advance of the glacier is necessary to incorporate such superimposed ice into the margin, and hence, to instigate development of this type of ice-cored moraine. Debris that slumps from the moraine onto forelying superimposed ice may become buried by new superimposed ice and be reincorporated into the margin. During a subsequent advance, this debris layer will be deformed, possibly overturned, and finally brought back to the surface where it will melt to form a new ridge. Such recycling of debris may result in very complex structures in an ice-cap margin. (Knapp-USGS)
W74-01955

THE SIMULATION OF SUBSURFACE EFFECTS ON THE DIURNAL SURFACE THERMAL REGIME IN COLD REGIONS,
Michigan Univ., Ann Arbor. Dept. of Geography.
S. I. Outcalt.
Arctic. Vol 25, No 4, p 305-307. 1972. Illus.
Identifiers: Climates, *Cold regions, Diurnal, Radiation, *Simulation, Subsurface, *Thermal regimes.

Melting rock glacier ice cores, massive ground ice and active layer depth variations contribute significantly to the surface thermal regime variance when these features are relatively close to the surface. Lake and sea ice depth variations with either spatially homogeneous light snow cover or none should be detectable particularly where there are large depth variations. Whereas surface climate simulation presents an explicit method of estimating the influence of a wide range of surface environmental factors, specifically albedo, emissivity, substrate radiation extenction (ice and snow), roughness, wetness, stratified thermal properties, slope and exposure, the method would appear to be extremely valuable in the experimental design and hypothesis formation phases of thermal mapping investigations in cold regions. Furthermore as the strategy can be employed to estimate the sensitivity of the surface thermal response to individual environmental factors to the method dictates the ground truth requirements for exploratory investigations. Lastly as process and environmental information becomes available the strategy can be used to construct explicit deterministic physical models of the spatial and temporal variance of surface thermal response which can be employed as an analytical portion of a remote sensing reconnaissance system specific to trafficability and site studies in arctic and alpine environments. In short, the capacity for modelling the surface thermal response as a function of the surface and substrate environment vastly increases the accessible information content of thermal IR maps particularly where these are acquired at several times during the diurnal cycle.--Copyright 1973, Biological Abstracts, Inc.
W74-01988

THE ARCTIC DREDGE, A BENTHIC BIOLOGICAL SAMPLER FOR MIXED BOULDER AND MUD SUBSTRATES,
National Museum of Natural Sciences, Ottawa (Ontario).
A. H. Clarke.
J Fish Res Board Can. Vol 29, No 10, p 1503-1505. 1972, Illus.
Identifiers: *Arctic, *Benthic sampler, Boulder, *Dredges, Mud substrates, Sampling.

Benthic biological dredges of a new design were used successfully on ice-rafted archibenthal and abyssal sediments of boulders and mud. The dredge is kite-shaped, of massive construction, and features a single point for cable attachment and a removable cannister for specimen retrieval. Experience in Baffin Bay, the Labrador Sea, and the Icelandic Shelf indicates that the arctic dredge is a reliable tool for arctic and subarctic research.--Copyright 1973, Biological Abstracts, Inc.
W74-02085

THE TUNDRA MICROCLIMATE DURING SNOW-MELT AT BARROW, ALASKA,
Alaska Univ., College. Geophysical Inst.
G. Weller, S. Cubley, S. Parker, D. Trabant, and C. Benson.
Arctic. Vol 25, No 4, p 291-300. 1972.
Identifiers: *Alaska (Barrow), Climates, *Microclimate, *Tundra, Snow-melt, Heat balance, Evaporation.

The microclimate of the tundra during spring of 1971 (29 May to 17 June) at Barrow, Alaska, is described and analyzed in terms of the heat balance at the terrestrial surface and the effects of terrain parameters on the heat balance components. Changes through the snowmelting period are large. Within 2 wk 35 cm. of snow are removed, soil interface temperatures increase by 15 degrees C, and the dry snow environment is replaced by a saturated water-soaked tundra surface. As a result, evaporation rates are high: up to 6 mm day -1 occurs immediately after the snow melt. The latent heat required for this is 40 times higher than during the pre-melting period.--Copyright 1973, Biological Abstracts, Inc.
W74-02095

2D. Evaporation and Transpiration

INCREASE IN FOLIAR TRANSPIRATION AS A RESULT OF TRAUMATISM IN THE AMPHISTOMATIC PLANTS,
Institut Pasteur, Paris (France).
J. Sivadjian.
C R Hebd Seances Acad Sci Ser D Sci Nat, Vol 275, No 22, p 2497-2499, 1972, Illus.
Identifiers: *Amphistomatic plants, Bean, *Hygrophotographic techniques, *Transpiration (Foliar), Traumatism.

The hygrophotographic technique which allows simultaneous observation of results on both sides of leaves was used to study the bean which has 2-side transpiration. The separation of the leaf from the stem by sectioning resulted in an increased opening of stomata. This modification, reflected in the increased transpiration of the sectioned leaves, can now be identified by the hygrophotographic technique. In amphistomatic leaves the phenomenon is very marked on the upper side.--Copyright 1973, Biological Abstracts, Inc.
W74-01735

GROWTH PRODUCTIVITY AND EVAPOTRANSPIRATION, DEPENDING ON SOIL MOISTURE UPON IRRIGATING A PEPPER (CAPSICUM ANNUUM L.) CULTIVATION, (IN ITALIAN),
Padua Univ. (Italy). Istituto di Agronomia Generale e Coltivazioni Erbacee ed Arboree.
For primary bibliographic entry see Field 03F.
W74-01762

COMPARATIVE STUDY BETWEEN THE EVAPORATION CALCULATED BY VARIOUS FORMULAS AND PAN EVAPORATION MEASURED IN THREE TROPICAL AREAS, (IN SPANISH),
Narino Univ., Pasto (Columbia). Facultad de Ciencias Agriculturas.
B. L. Legarda, and W Forsythe.
Turrialba. Vol 22, No 3, p 282-292. 1972. (English summary).
Identifiers: Comparative study, *Evapotranspiration, *Evaporation, Formulas, Measured, *Pan evaporation, Transpiration, *Tropical areas.

This study compared the evaporation calculated by the formulas of Blaney-Criddle, Garcia-Lopez, Grassi-Christiansen, Holdridge, Thornthwaite, Papadakis and Van Bavel-Penman, with data of pan evaporation of 3 tropical areas: Turrialba and Alajuela in Costa Rica and Monymusk in Jamaica. The available data of pan evaporation was used as a basis to evaluate the formulas since good correlation exists between pan evaporation and potential evapotranspiration in various places. The following evaluations were made: correlation which was used as a measure of the accuracy of the formula; analysis of variance in which pan evaporation data was used as a basis for its calculation; the ratio between the calculated evaporation and pan evaporation for each month was determined and designated the A factor, and the average for each local was determined. The local average of the A factor was applied to calculations of the formulas and an analysis of variance was repeated and in this way the deviation of the adjusted calculations was determined. The following formulas were chosen as having the best characteristics for the region studied: Garcia-Lopez which had good correlation and agreement; Papadakis which had fair correlation and agreement, and in addition, the agreement improved by 68% on applying the relatively constant regional A factor of 0.82; and Van Bavel-Penman which had the highest average correlation, but poor agreement. However, the application of a considerably constant regional A factor of 0.56 improved the agreement by 294%.--Copyright 1973, Biological Abstracts, Inc.
W74-01870

HEAT AND WATER VAPOR EXCHANGE BETWEEN WATER SURFACE AND ATMOSPHERE,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
W. H. Brutsaert.
Environmental Protection Agency, Technology Series Report EPA-R2-73-259, May 1973. 59 p, 10 fig, 3 tab, 6 ref. EPA Project 16130 DIP.

Descriptors: *Evaporation, *Heat transfer, *Air-water interfaces, Estimating equations, Mass transfer, *Water cooling, Diffusion, *Water vapor, Model studies, Evapotranspiration, *Diffusivity, Turbulent flow, Thermal pollution.
Identifiers: *Turbulent diffusion models.

The physical and mathematical aspects of simultaneous turbulent heat and water vapor exchange between a large open water body and the surrounding atmosphere were studied. Thus analytical and numerical solutions were developed for various conditions of fetch, surface roughness, atmospheric stability, etc., that are likely to be of physical importance. One of the main findings was that in spite of some theoretical limitations the semi-empirical turbulent diffusion model provides a method for the prediction of heat and water vapor transfer that should be useful for engineering calculations. Although the interaction between momentum, sensible heat and water vapor is considerable, for evaporation or cooling calculation purposes it is probably permissible to uncouple their transfer mechanisms provided the water surface temperature is known and the averaging period uner consideration is of the order of, say, a week. In addition the validity of the semi-empirical assumption in the near-water surface layer was analyzed by determining the anisotropy of the eddy diffusivity, the effects of radiative transfer and of water wave action on the eddy diffusivity. Finally, a practical method was developed to determine evapotranspiration from the surrounding land surface based on the geostrophic drag concept. (EPA)
W74-01930

TRANSPIRATION OF ATRIPLEX CONFERTIFOLIA AND EUROTIA LANATA IN RELATION TO SOIL, PLANT AND ATMOSPHERIC MOISTURE STRESSES,
San Diego State Coll., Calif. Dept. of Biology.
R. T. Moore, R. S. White, and M. M. Caldwell.
Can J Bot. Vol 50, No 12, p 2411-2418. 1972. Illus.
Identifiers: Atmospheric conditions, *Atriplex-confertifolia, *Eurotia-lanata, Leaf, Light, Moisture, Phenology, Seasons, Speed, Stresses, Temperature, *Transpiration, Wind, *Soil-water-plant relationships, Multiple regression analysis.

A. confertifolia and E. lanata plants were studied in the field and laboratory under controlled conditions of temperature and vapor pressure deficit with uniform wind speed and light intensity and various levels of water stress. Multiple regression analysis indicated that under both field and laboratory conditions, vapor pressure deficit and water stress were significant factors influencing transpiration. Phenological stage was also a major factor in the transpirational relationships of both species in the field. Transpiration rates under comparable conditions tended to be higher for Eurotia than for Atriplex on a leaf dry weight basis with less pronounced differences on a leaf area basis. However, in the latter part of the summer, transpiration rates of Eurotia decreased markedly while Atriplex tended to maintain active transpiration. Under laboratory conditions, both species exhibited transpiration at plant moisture stress values as great as 115 bars.--Copyright 1973, Biological Abstracts, Inc.
W74-01990

2E. Streamflow and Runoff

THE ROLE OF MOLECULAR DIFFUSION IN DISPERSION THEORY,
Hebrew Univ., Jerusalem (Israel).
Z. Weinberger, and S. Mandel.
Journal of Hydrology, Vol 19, No 4, p 361-365, August 1973. 1 fig, 6 ref.

Descriptors: *Mixing, *Dispersion, *Diffusion, *Groundwater movement, Porous media, Turbulent flow, Equations, Tracers, Mathematical studies, *Open channel flow.

The analytic derivations of the equations governing dispersive flow assume that different solutions entering an interstitial flow channel are completely mixed at the exit node of the flow channel. The physical mechanisms which can effect this mixing are turbulence and molecular diffusion between the solutions in the channel. At the interstitial velocities ordinarily encountered in groundwater flow, turbulence is not effective as a mixing mechanism whereas molecular diffusion is. For the equations of dispersive flow to be valid the flow velocities must be sufficiently large so that molecular diffusion can be neglected when compared to the dispersion due to the random hydraulic flow through the elementary channels. This velocity is about 10 cm per day. (Knapp-USGS)
W74-01713

DYNAMICS AND THERMAL REGIMEN OF RIVER FLOWS (DINAMIKA I TERMIKA RECHNYKH POTOKOV).
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.

Izdatel' stovo 'Nauka', Moscow, K. I., Rossinskiy, editor, 1972. 144 p.

Descriptors: *River flow, *Hydrodynamics, *Temperature, Turbulence, Turbulent flow, Waves (Water), Winds, Dispersion, Diffusion, Channels, Canals, Erosion, Mudflows, Fluvial sediments, *Sediment transport, Saltation, Suspended solids, Sediment discharge, Sediment control, Bodies of water, Ice.
Identifiers: *USSR.

Preliminary results are presented of theoretical and experimental investigations conducted in 1969-70 at the Department of Hydrophysics of the USSR Academy of Science's Institute of Water Problems. The papers presented are grouped

under 3 subject headings: dynamics and thermal regimen of rivers in connection with water-resource use (4 papers); movement of river sediments and formation of channels (6 papers); and investigations of turbulent and wave flows (3 papers). Topics of individual papers include: hydrodynamics of river flows; ice and thermal regimes of rivers, lakes, and reservoirs; a theory of suspended-sediment movement; saltation of river sediments; deformations of artificial channels in sandy materials; mudflow control on the Zailiski Ala Tau mountain range; and turbulent structure of plane and axisymmetric air flows. (Josefson-USGS)
W74-01722

NATURE OF SEVEN-YEAR CYCLES IN LONG--TERM FLUCTUATIONS OF VOLGA RUNOFF (O PRIRODE SEMILETNEY TSIKLICHNOSTI V MNOGOLETNIKH KOLEBANIYAKH STOKA VOLGI),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. P. Smirnov, E. I. Sarukhanyan, and O. F. Kondratsova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 163-175, Leningrad, 1972. 10 fig, 3 tab, 12 ref.

Descriptors: *Runoff, *Rivers, *Fluctuations, *Cycles, Discharge (water), Air circulation, Atmospheric pressure, Winter, Correlation analysis.
Identifiers: *USSR (Volga River), Spectrograms.

The character of Volga runoff fluctuations which have a period of about 6-7 years is examined. A relation is established between these fluctuations and nutations of the pole of Earth rotation. Maximum values of average annual discharges at Volga gaging stations in a 6-7 year cycle are observed in years when the radius vector of the pole of rotation crosses the Greenwich meridian in winter months. A detailed analysis is made of the relation of water discharges in the Volga basin in a 6-7 year cycle to the character of atmospheric circulation in winter. (See also W74-01723) (Josefson-USGS)
W74-01727

INDEX OF TIME-OF-TRAVEL STUDIES OF THE U.S. GEOLOGICAL SURVEY,
Geological Survey, Reston, Va.
C. W. Boning.
Water-Resources Investigations 34-73, September 1973. 71 p, 3 tab, 19 ref.

Descriptors: *Flow rates, *Dye releases, *Travel time, *Indexing, *United States, Sites, Pollutants, Streamflow forecasting, Path of pollutants, Reach (streams), Hydraulics.

This index identifies locations on streams where the U.S. Geological Survey has investigated the time of travel of a highly soluble material moving through a reach of stream channel; it contains no basic data. It does contain a list of references to published data and analytical reports on time of travel and a list of U.S. Geological Survey offices where basic time-of-travel data are on file. The purpose of this index is to assist individuals and agencies locate time of solute travel data. Although a great deal of information is available, some is provided in a variety of publication series, and some is unpublished but available for inspection and use. Since the study sites and data sources are not well known, the compilation in this index should benefit future research and analytical efforts. The index is concerned only with studies conducted by the Geological Survey prior to May 1973. Many of the studies were done in cooperation with other federal and state agencies. The basic procedure in most measurements of the time of travel is to inject into the upstream end of a study reach a volume of radioactive or fluorescent dye tracer and then to monitor the passage of that tracer at one or more downstream sites. (Woodard-USGS)
W74-01874

COMPOUND WEIR STUDY, (IN CHINESE)
Taipei Hydraulic Research Lab., (Taiwan).
S. P. Mao.
Taipei Hydraulic Research Laboratory Research Bulletin, Series A: Hydraulic Model Studies, No 30, August 1972. (English summary) 16 p, 11 fig.

Descriptors: *Streamflow, *Runoff, *Discharge measurement, *Weirs, Flowmeters, Flow rates, Model studies, Correlation analysis, Analytical techniques, Floods, Low flow, Foreign countries.
Identifiers: *Taiwan, Compound weir, Rectangular weir, Triangular weir.

Measurement of runoff in Taiwan using the compound weiris described. The natural conditions of Taiwan include high mountains and rivers of great velocity, relatively high rainfall intensity, and plenty of annual rainfall, although uneven in distribution. Typhoons and rainstorms cause the runoff of drainage areas to increase rapidly; while in dry seasons streams in the valley almost stop running. Under such circumstances, runoff measurement cannot be made by using the ordinary rectangular or triangular weir. Only the compound weir meets the requirement of measuring the highest and lowest discharge. The compound weir has a rectangular shape in its upper part and triangular in lower part. During floodflow, the runoff can be measured by the rectangular part, and in the arid season, when the discharge of the stream is small, runoff can be measured by the lower triangular part of the compound weir. (Woodard-USGS)
W74-01875

OCEAN CURRENT MONITORING EMPLOYING A NEW SATELLITE SENSING TECHNIQUE,
National Environmental Satellite Service, Washington, D.C.
A. E. Strong, and R. J. DeRycke.
Science, Vol 182, No 4111, p 482-484, November 2, 1973. 2 fig, 10 ref.

Descriptors: *Waves (water), *Ocean currents, *Remote sensing, Ocean circulation, Ocean waves, Satellites (artificial).
Identifiers: *Gulf Stream.

The very-high-resolution radiometer on the NOAA-2 (National Oceanic and Atmospheric Administration) satellite obtained imagery in the visible channel containing sunglint over a major portion of the coastal waters off the eastern seaboard of the United States. An abrupt change in surface roughness was observed at the shoreward edge of the Gulf Stream Current from Florida to Cape Hatteras; it results from the opposition of waves propagating against the flow of the Gulf Stream. (Knapp-USGS)
W74-01876

ANADROMOUS FISH WATER REQUIREMENTS,
California State Dept. of Fish and Game, Sacramento.
For primary bibliographic entry see Field 08I.
W74-01880

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR NORTH CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01884

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01889

INDEX OF STREAM GAGING STATIONS IN AND ADJACENT TO CALIFORNIA, 1970,
California State Dept. of Water Resources, Sacramento.
R. L. Chastain.
Bulletin No 157, June 1971. 151 p, 2 plate.

Descriptors: *Gaging stations, *Streamflow, *Flow measurement, *California, Networks, *Indexing, Stream gages, Sites, Drainage area, Equipment, Water quality, Publications, Computer programs, Data processing.

All known stream-gaging stations in California, past and present, and some tributary to California, are listed alphabetically by station name and numerically by Department of Water Resources number. Information is provided for nearly 4,500 stations. The information includes U.S. Geological Survey number, location, collecting agency, county, station class, drainage area, regulation and diversion, period of record, equipment, quality of record, and publication status. Also provided is a list of computer programs using streamflow data that are available in the Department of Water Resources. These station data are current as of July 1970. (Woodard-USGS)
W74-01943

FLOOD PLAIN INFORMATION, KENAI RIVER, PHASE I, KENAI PENINSULA BOROUGH, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 04A.
W74-01952

BLACK HILLS FLOOD OF JUNE 9, 1972.
National Oceanic and Atmospheric Administration, Rockville, Md.

Natural Disaster Survey Report 72-1, August 1972. 20 p, 8 fig.

Descriptors: *Floods, *South Dakota, *Warning systems, *Flash floods, Flood forecasting, Data collections.
Identifiers: *Black Hills, *Rapid City (S Dak).

The morning after the disastrous flood of June 1972 swept through the canyons and valleys of the Black Hills of South Dakota, a survey team was dispatched to the devastated area to review the effectiveness of NOAA's warning service and to identify weaknesses that require remedy. In a few hours during the late afternoon and evening of June 9, 1972, a record rain fell on the Black Hills of South Dakota. A stationary group of thunderstorms over the Central Hills dumped as much as 15 inches of rain in some locations in less than 6 hours. The rains resulted in record-breaking floods on streams draining the eastern slopes of the Black Hills. Flash flood warnings issued by the National Weather Service Office (WSO) at Rapid City, S. Dak., were timely and useful. Prompt action by State, city, and county officials, and the Rapid City radio and TV stations undoubtedly saved a great number of lives. However, at the time of the flood there was no organized real-time reporting system for river flow and rainfall that was able to provide essential information. Action should be accelerated to determine the needs and to establish a river flow and rainfall reporting system suitable for use in the maintenance of the flash flood warning program. (Knapp-USGS)
W74-01953

PARAMETERS INFLUENCING MINIMUM STREAMFLOW,
Wyoming Univ., Laramie. Water Resources Research Inst.
T. A. Wesche, and P. A. Rechard.
In: Hydraulic Engineering and the Environment, Proceedings of the Hydraulic Division Specialty Conference, Bozeman, Montana, August 15-17, 1973. p 21-30, 1973. 3 tab, 10 ref. OWRR B-007-WYO (4). 14-31-0001-3668.

Descriptors: *Streamflow, Fish reproduction, Water quality, *Fish populations, *Trout, *Channel flow, Hydraulics.
Identifiers: *Average daily flow.

Basic to fish production are the quantity, quality and stability of the stream environment. When a water development project such as a dam or diversion is proposed on a stream, it is important to establish the amount of water required in the stream channel below the development to maintain the fish populations present. The tool and techniques currently available for making a minimum flow determination are not well developed. The factors upon which trout production depend are water quality, adequate food supply, spawning areas and shelter. The stream discharge, as influenced by the channel configuration, must meet the hydraulic requirements necessary to provide these factors. The determination of a suitable minimum flow is a difficult problem. The approach taken has centered on the following three types of physical stream characteristics and the changes observed in them between various levels of flow, based on the average daily flow (ADF) over the period of record: Hydraulic parameters; Surface area-water types; and Available trout cover. In the determination of a minimum flow for trout, these factors must be considered together, not separately. The results of this study have shown that for each physical parameter investigated, the greatest rate of decrease was observed for the discharge reduction from 25% to 12.5% ADF.
W74-02119

HYDROLOGIC REPORT LITTLE CALUMET RIVER AND TRIBUTARIES, PART I.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for State of Indiana Department of Natural Resources, Division of Water, Indianapolis, Indiana, January 14, 1969. 99 p, 38 fig, 16 tab, 4 append.

Descriptors: Hydrology, *Hydrographs, *Synthesis, *Indiana, Streamflow, Streamflow forecasting, Surface runoff, Storms, Climatic data, Hydrologic data.
Identifiers: *Little Calumet River (Indiana).

The hydrology of the Little Calumet River and its tributaries was studied for the State of Indiana. The Little Calumet River is located in the northeastern part of the State. It has a total watershed of about 416 square miles and at one time flowed westward into Cook County, Illinois. However, the flow was reversed in 1926 by the construction of the Burns Ditch and Burns Waterway which provided an outlet to Lake Michigan. Five general aspects of hydrology were studied: (1) high river flows, studied by the synthetic hydrograph method using storm patterns transposed from other geographical areas, (2) minimum flows, (3) flood frequency, (4) flow duration, and (5) high water elevations of Lake Michigan. In Part II of the report of this study, the method used to develop the synthetic hydrographs is explained and a method developed by the Indiana Department of Natural Resources, using non-linear evaluations, is also used to develop hydrographs. Five large storms were studied in both methods, and the synthetic hydrographs were produced at 22 points along the River. Discussions and comparisons of the synthetic hydrographs are contained in a separate appendix to Part I. (Poertner)
W74-02127

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-02137

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MUKEWATER CREEK, COLORADO RIVER BASIN TEXAS, 1971,
Geological Survey, Austin, Tes.
For primary bibliographic entry see Field 04D.
W74-02140

ON SMALL SCALE BREAKING WAVES,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
M. L. Banner, and O. M. Phillips.
Technical Report 82, (Reference 73-8), July 1973. 23 p, 8 fig, 6 ref. ONR N00014-67-A-0163-0009 NSF Grant GA-35390X.

Descriptors: *Waves (Water), Unsteady flow, Vortices, *Ocean waves, Turbulence, Winds, *Surf.
Identifiers: *Breakers (Waves), Wind drift.

The surface wind drift in the ocean substantially reduces the maximum wave height and wave orbital velocity that can be attained before breaking. Incipient breaking is characterized by the occurrence of stagnation points at wave crests, but not by discontinuities in slope. After breaking, there is in the mean flow a stagnation point relative to the wave profile near the crest of the broken wave, on one side of which the water tumbles forward and behind which it recedes more smoothly to the rear. Flow visualization studies indicate the general extent of the wake behind the breaking region; it is shown to be turbulent but momentumless. (Knapp-USGS)
W74-02144

2F. Groundwater

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 04B.
W74-01721

FORAMINIFERS OF LAKE ISSYK-KULL AND GROUNDWATERS OF CENTRAL ASIA, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
For primary bibliographic entry see Field 02H.
W74-01763

GEOLOGY OF MERCER AND OLIVER COUNTIES, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 04B.
W74-01887

THE SUBSIDENCE OF THE SURFACE BETWEEN MOGOTES IN PURETO RICO EAST OF ARECIBO,
Technische Universitaet, Hanover (West Germany). Geographisches Institut.
F-D. Miotke.
Caves and Karst, Vol 15, No 1, p 1-12, January-February 1973. 11 fig, 20 ref.

Descriptors: *Karst hydololgy, *Geomorphology, *Weathering, *Pureto Rico, Tropical regions, Karst, Topography, Water chemistry, Carbonate rocks, Land subsidence, Subsurface drainage.
Identifiers: *Mogotes.

In a small area of mogotes and intervening depressions in northern Pureto Rico, solution of limestone is especially active at the foot of the steep slopes of the mogotes and beneath broad plains of blanket sands. The subsidence of the surface between the mogotes is the result of local collapse of cavities beneath the blanket sand, as well as the sheet solution. Chemical analyses of both surface- and underground water show that there is little significant difference in the process of solution of limestone in the Tropics and in temperate zones, even though the morphologic features are different. (Knapp-USGS)
W74-01912

BIBLIOGRAPHY AND INDEX OF OKLAHOMA GEOLOGY--1972,
Geological Survey, Norman, Okla.
E. A. Ham, and W. D.Rose.
Oklahoma Geology Notes, Vol 33, No 2, p 31-65, April 1973. 258 ref.

Descriptors: *Geology, *Bibliographies, *Documentation, *Oklahoma, Publications, Abstracts, Information retrieval, Petrology, Oil groundwater, Aquifers, Mineralogy, Stratigraphy, Reviews.

This bibliography, contains 258 documents pertaining to Oklahoma geology. References are listed alphabetically by author (or agency when no author is given). Also included is a subject indes. (Woodard-USGS)
W74-01916

THAT SINKING FEELING,
National Oceanic and Atmospheric Administration, Washington, D.C.
J. D. Bossler.
NOAA, Vol 3, No 4, p 52-53, October 1973. 1 fig, 1 photo.

Descriptors: *Land subsidence, *Withdrawal, Groundwater, Oil fields, Subsidence, Compaction, Water wells.

Land subsidence stems from two kinds of factors--those caused by nature, and those caused by man. Among the latter are the withdrawal of sand, water, oil, gas and other fluids. The amount of subsidence is dependent upon the the underlying geological sediments, and under some conditions may approximate as much as 25% of the amount of fluid withdrawn. In the Los Angeles and Long Beach harbor area, a maximum subsidence of about nine meters has been reported on Terminal Island. Another area of rapid subsidence is the Houston, Texas metropolitan area, where surveys have shown a maximum subsidence at one point of almost 2.5 meters in the past 30 years, including 1.2 meters in the last decade. One of the most highly publicized areas of subsidence is Venice, Italy, and the Po Delta, just south of the city. The land sinking in the Po Delta is attributed to the withdrawal of methane gas while the cause of the flooding in Venice is not well defined. In the Baton Rouge, La., area, subsidence has been estimated at close to that recorded in the Houston area. Most of the subsidence is attributed to the withdrawal of water for industrial and domestic purposes. Subsidence is also a problem in the San Joaquin and Imperial Valleys of California. (Knapp-USGS)
W74-01920

GEOLOGY OF BURKE COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
T. F. Freers.
North Dakota Geological Survey Bulletin 55 - Part I, and North Dakota State Water Commission County Groundwater Studies 14 - Part I, 1973. 32 p, 13 fig, 3 plate, 2 tab, 14 ref.

Descriptors: *Geological surveys, *Geologic mapping, *Geologic formations, *Hydrogeology, *North Dakota, Geologic investigations, Geomorphology, Aquifers, Topography, Sediments, Land forming, Aerial photography, Stratigraphy.
Identifiers: *Burke County (N. Dak).

This report is the first of a four-part series on the geology and groundwater resources of Burke and Mountrail Counties, North Dakota. Burke County is in northwestern North Dakota near the center of the Williston basin. It is underlain by sedimentary rocks of Paleozoic, Mesozoic, and Cenozoic age which range in thickness from about 9,400 to 11,700 feet, thickening southward and generally dipping gently to the south or southwest. The surficial deposits are glacial drift of Late Wisconsinan age except for scattered exposures of the Tertiary Sentinel Butte and Tongue River Formations in the northern part of the county and slough and spring deposits of the Coteau and Coteau escarpment areas. Surficial deposits consist chiefly of glacial till and outwash with some areas of postglacial sand, silt and clay. The county has been divided into four areas on the basis of topography: (1) the Central Lowlands which is an area of generally low relief, (2) the Missouri Escarpemtn which is a steep northward sloping band south of the Central Lowlands, (3) the Missouri Coteau which is an area of moderate to high relief and (4) the Coteau slope which is an area of low to moderate relief. (Woodard-USGS)
W74-01923

THEORETICAL ANALYSIS OF FORCED CONVECTIVE HEAT TRANSFER IN REGIONAL GROUND-WATER FLOW,
Illinois Univ., Urbana. Dept. of Geology.
P. A. Domenico, and V. V. Palciauskas.
Geological Society of America Bulletin, Vol 84, No 12, p 3803-3813, December 1973. 5 fig, 9 ref.

Descriptors: *Convection, *Groundwater movement, *Geothermal studies, Water circulation, Energy transfer, Heat transfer, Mass transfer, Hot springs, Thermal springs, Water temperature, Warm springs.

Anomalous temperature distributions in geologic basins may be caused by the spatial redistribution of heat by moving groundwater. This problem is examined by solving the energy equation for the simultaneous transport of water by hydraulic gradients and heat by forced convection. The severity of an anomalous geothermal gradient or temperature measurement depends primarily on the relative magnitude of the ratio of hydraulic conducitivity to thermal diffusivity, and on the geometry of the flow field. A dimensionless group may be formulated from these parameters, and provides a relative measure of the simultaneous transport of heat by the bulk motion of the fluid to that by pure conduction. Solutions to the equation indicate that convective heat losses in groundwater recharge areas are balanced by convective heat gains in discharge areas. The geothermal gradient accordingly increases with increasing depth in recharge areas, decreases with increasing depth in discharge areas, and is a manifestation of pure conduction at the hinge line separating areas of recharge and discharge. (Knapp-USGS)
W74-01957

GEOLOGIC FACTORS AFFECTING COMPACTION OF DEPOSITS IN A LAND-SUBSIDENCE AREA,
Arizona Univ., Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 04B.
W74-01958

GROUNDWATER DISCHARGE INTO SEAS (O RAZGRUZKE PODZEMNYKH VOD V MORYA),
Akademiya Nauk SSSR, Moscow, Institut Vodnykh Problem.
I. S. Zektser, V. A. Ivanov, and A. V. Meskheteli.
Vodnyye Resursy, No 3, p 125-146, 1972. 2 fig, 133 ref.

Descriptors: *Base flow, *Groundwater, *Sea water, *Oceans, *Submarine springs, Hydrologic cycle, Water balance, Salt balance, Hydrodynamics, Hydrology, Hydrogeology, Marine geology, Oceanography, Sedimentology, Geomorphology, Geophysics, Geothermal studies, Geochemistry, Water chemistry, Model studies.
Identifiers: USSR, Dye-tracer studies.

The problems of groundwater discharge into seas and oceans include: (1) a study of the role of subsurface discharge into seas in the world water balance and global hydrological cycle; (2) an estimate of groundwater effects on formation of water and salt balances of seas and large lakes; (3) a study of seawater and groundwater relations in littoral regions; (4) a study of groundwater discharge as it affects formation of mineral resources at the ocean bottom; and (5) a study of areas of fresh groundwater discharge in littoral zones of seas for water supply. Techniques of investigations of groundwater discharge into seas and oceans include: (1) methods based on a study of the watershed area bordering a sea; and (2) methods based on a study of the water body. The first group includes the hydrodynamic method, the method of average long-term water balance, the hydrologic-hydrogeological method, and the method of simulation. The second group includes methods based on a study of seawater (measurement of its electrical conductivity, study of its temperature distribution and chemical composition, and dye-tracer studies of groundwater discharge); and methods based on a study of the sea bottom (investigation of groundwater discharge from physical or chemical anomalies in bottom sediments--the geothermal and geochemical methods; and a study of geostructural conditions of the sea bottom--the geophysical method; marine geomorphological investigations; and observations using shallow-water diving techniques and bathyscaphes). The clearest manifestation of groundwater discharge into seas is the discharge of submarine springs. (Josefson-USGS)
W74-01962

FRESH GROUNDWATER YIELD IN THE USSR AND PROSPECTS FOR ITS USE (OB EKSPLUATATSIONNYKH RESURSAKH PRESNYKH PODZEMNYKH VOD SSSR I PERSPEKTIVAKH IKH ISPOL'ZOVANIYA),
For primary bibliographic entry see Field 04B.
W74-01965

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02138

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02141

GEOLOGY OF MOUNTRAIL COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
L. Clayton.
North Dakota Geological Survey Bulletin 55 - Part IV, and North Dakota State Water Commission County Groundwater Study 14 - Part IV, 1972. 70 p, 9 fig, 2 map, 1 tab, 27 ref.

Descriptors: Hydrogeology, *Geological surveys, *Geologic mapping, *Groundwater resources, *North Dakota, Water pollution sources, Geologic investigations, Geologic formations, Geomorphology, Topography, Sediments, Erosion, Sedimentation, Lakes, Ponds, Water quality, Stratigraphy, Geologic history.
Identifiers: *Mountrail County (N Dak).

This is volume IV of a four-volume report on the geology and groundwater resources of Burke and Mountrail Counties, N. Dak. This volume is divided into two sections. Section A is a description of the topography, the rock and sediment, and the general hydrology of Mountrail County. In addition, section A contains a brief summary of the age and origin of the topography, rock, and sediment of the county. Section A is written for those (especially nongeologists) who are interested in the physical nature of the near-surface earth materials underlying the county. Section B is a more detailed discussion of the problems involved in determining the age and origin of the geologic materials and landforms in Mountrail County. This section is written for those (especially geologists) who are interested in the geologic processes and sequence of events during late Cenozoic time in this area. Contractors and civil engineers interested in the gross characteristics of foundation materials at potential construction sites can determine the kinds of materials to be expected from a map inciuded. General information concerning groundwater pollution also is presented. (Woodard-USGS)
W74-02145

2G. Water in Soils

RELATIVE LEACHING RATES OF COMMON NITROGEN CARRIERS FROM SANDY SOILS IN RELATION TO LAKE EUTROPHICATION,
Rollins Coll., Winter Park, Fla. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-01654

INTERPRETATION OF ERTS-MSS IMAGES OF A SAVANNA AREA IN EASTERN COLOMBIA.
Centro Interamericano de Fotointerpretacion, Bogota (Colombia).
G. W. W. Elbersen.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 105-119, 1973. 4 fig, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Soil surveys, *South America, Soil types, Data collections, Forests, Land management.
Identifiers: ERTS, *Colombia.

ERTS imagery was used for extrapolation of existing soil maps into unmapped areas of the Llanos Orientales of Colombia. Most units delineated in the existing reconnaissance soil map at a scale of 1:250000 could be recognized and delineated in the ERTS image. In those cases where delineations were unsatisfactory it is to be expected that repeated ERTS coverage could improve the results. The resulting map shows sufficient detail to justify a publication scale of 1:500.000. It can be classified as a soil map between the exploratory and schematic types. With repeated ERTS coverage and some field work it may be improved to between the exploratory and reconnaissance types. These maps are useful in the first stages of planning in remote undeveloped areas. The application of conventional photointerpretation techniques (physiographic analysis) on ERTS imagery can yield significant practical results especially in the developing countries. (See also W74-01663) (Knapp-USGS)
W74-01677

DELINEATION OF MAJOR SOIL ASSOCIATIONS USING ERTS-1 IMAGERY,
Tennessee Univ., Knoxville. Dept. of Soil Science.
W. L. Parks, and R. E. Bodenheimer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 121-125, 1973. 3 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Soil surveys, Tennessee, Soil types, Data collections, Soil moisture, Land use, Surveys.
Identifiers: ERTS.

A major soil association in the loess region of Obion County was delineated using ERTS-1 imagery. Channel 7 provides the clearest differentiation. Separation of other smaller soil associations in an intensive row crop agricultural area is somewhat more difficult. Soil differentiation was accomplished visually as well as with a scanning microdensitometer. Lower altitude aircraft imagery permits a more refined soil association identification and where imagery is of sufficient scale, even individual soils may be identified. (See also W74-01663) (Knapp-USGS)
W74-01678

SEPTIC SYSTEMS: EFFECTS OF SURFACE AND SUBSURFACE WATER,
Lake County Health Dept., Waukegan, Ill.
For primary bibliographic entry see Field 05B.
W74-01716

WATER MANAGEMENT USING SUBSURFACE DRAINS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01717

REDUCING SEEPAGE FROM STOCK TANKS WITH UNCOMPACTED, SODIUM-TREATED SOILS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 04A.
W74-01718

SOIL PROPERTIES IN RELATION TO THE GROWTH AND YIELD OF OIL PALM (ELAEIS GUINEENSIS JACQ.) IN SURINAM,
Landbouwproefstation, Paramaribo (Surinam).
F. W. Van Amson.
Landbouwproefstn Suriname Bull. 89. p 4-103, 1972, Illus.
Identifiers: Drought, Elaeis-guineensis, Growth, Nitrogen, *Oil palm, Pueraria-javanica, *Soil properties, *Surinam, Yield, *Soil-water-plant relationships.

Morphological, chemical and physical soil data were collected, to obtain information about growth and yield of the palm in relation to soil properties. Root studies and foliar analysis were included. Fifteen year old palms were observed, growing on a hydromorphic sequence of very fine loamy sand in the Old Coastal Plain. Oil palms about 7 yr of age, cultivated on the hill soils of the interior also were studied. With exception of the palms planted on the heavy clay soils of the Young Coastal Plain those on a very poorly drained silty soil of the Old Coastal Plain, oil palms grew and yielded well under a variety of soil conditions. Extreme drought will cause a retarded growth on a medium drained loamy sand. Podzolic loamy sand with a water table of plus or minus 30 cm below the surface during the rainy season, will profit in extremely dry years from the relatively higher moisture content in the subsoil. The best yield was obtained from a medium to poorly drained loamy sand. Soils which are not influenced by the water table and with a sandy loam to clay loam texture form a favorable root and growth medium. High yield is mainly related to a high number of bunches. Horizons with a large amount of gravel or iron concretions form only a temporary obstacle for root penetration. Under normal rainfall conditions, 7 yr old palms growing on soils with a hardpan, have still been capable of satisfactory production. Drought is more harmful than periods of heavy rainfall. The results of the foliar analysis were not conclusive, but N seems to be limiting. This is caused by small N applications as a consequence of an over-estimation of the N supplying potentials of kudzu (Pueraria javanica).--Copyright 1973, Biological Abstracts, Inc.
W74-01736

CONCEPTS IN VEGETATION/SOIL SYSTEM DYNAMICS: POST STEADY-STATE,
Australian National Univ., Canberra. Dept. of Forestry.
For primary bibliographic entry see Field 02I.
W74-01739

INFILTRATION AND LEACHING OF A LOCATED TRACTER IN AN UNSATURATED SOIL: EFFECT OF INITIAL MOISTURE CONTENT, (IN FRENCH),
Institut National de la Recherche Agronomique, Dijon (France). Station d'Amerioration des Plantes.
Y. Clouet, A. Feodoroff, A. Libois, and Suzanne, Meriaus.
Ann Agron (Paris). Vol 23, No 4, p 461-468, 1972. Illus. (English summary).
Identifiers: Displacement, *Infiltration, *Leaching, Moisture, Porosity, Salt, Soils, Tracer, *Unsaturated soil.

The infiltration velocity of a non-saturating rainfall is higher with the higher initial content. This may be due to considerable porosity. Displacement of a located soluble salt into the soil is directly affected by the depth of infiltration. In the soil tested, the displacement of the salt, for the same water supply, was greater with the higher initial moisture content.--Copyright 1973, Biological Abstracts, Inc.
W74-01752

WATER-SALT BALANCE OF SALINE SOILS UNDER IRRIGATION AT THE FOOTHILL PLAINS OF GOLODNAYA STEPPE, (IN RUSSIAN).
Moscow State Univ. (USSR). Dept. of Pedology.

Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 3, p 83-92, 1972. Illus. (English summary).
Identifiers: Drainage, Foothills, Irrigation, Leaching, Plains, *Saline soils, Salts, Soils, *USSR (Golodnaya Steppe), *Water-salt balance.

The effectiveness of different drainage types in the soil desalinization process were compared. The optimal conditions of drainage were determined to achieve the total effect of leaching on saline soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01753

EFFECT OF IRRIGATION AND ALKALI TREATMENT ON THE MICROBIOLOGICAL PROCESSES IN SOIL, (IN UKRAINIAN),
Khersonskii Selskokhozyaistvennyi Institut (USSR).
For primary bibliographic entry see Field 03F.
W74-01761

SPECTROPHOTOMETRIC DETERMINATION OF SOIL WATER CONTENT,
S. A. Bowers, and S. J. Smith.
Soil Sci Soc Am Proc. Vol 36, No 6, p 978-980, 1972. Illus.
Identifiers: *Soil water, *Spectrophotometry, *Absorbance.

The absorbance at 1.9 micro by a soil-methanol extract was used for measuring the soil water contents of 3 different textured soils. A linear relation between absorbance and soil water content was adequate for moisture determinations ranging from air dry to the moisture equivalent. For Quincy loamy sand and Barnes loam soils, calibration based only on laboratory standards was sufficient. For Houston Black clay, calibration against oven-dry samples was necessary. Determination time was approximately 1 hr.--Copyright 1973, Biological Abstracts, Inc.
W74-01770

NITRATE IN UNSATURATED ZONE OF AN ALLUVIAL SOIL IN RELATION TO FERTILIZER NITROGEN RATE AND IRRIGATION LEVEL,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
D. C. Adriano, P. F. Pratt, and F. H. Takatori.
J Environ Qual. Vol 1, No 4, p 418-422. 1972, Illus.
Identifiers: *Alluvial soils, Apium-Graveolens, Asparagus-Officinalis, Denitrification, Drainage, *Fertilizers, Irrigation, *Nitrates, Nitrogen, *Soil (Unsaturated zone), Celery, Asparagus.

Soil samples to the 15-m depth beneath asparagus (Asparagus officinalis L.) and celery (Apium graveolens L.) were taken to determine the NO3-concentration in the solution of the unsaturated zone and to estimate the soil N balance. Transit time for water to move to the 15-m depth was calculated from drainage volumes and volumetric water contents. N balance was calculated from data for N input, N removal in harvested crops, and water records for the calculating of transit time. The NO3-concentration in the unsaturated zone increased with increase in N rate but was inversely related to the leaching volume. Denitrification was assumed to be the cause of high N losses with high irrigation levels. However, the rather high loss of 67.7% in the celery experiment, which received large amounts of chicken manure, was assumed to be a result of both net immobilization and denitrification. A combination of high losses of N, which ranged 18.3-67.7%, and large amounts of excess N, in the NO3-form in the soil could have been 1 cause of the low efficiency of recycling N by these crops. High rates of N combined with high levels of water use are apparently conducive to denitrification in relatively permeable soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01774

ENTRY OF CHEMICAL ELEMENTS--ANALOGUES (STRONTIUM-90-CALCIUM AND CESIUM-137-POTASSIUM) INTO PLANTS IN RELATION TO SOIL MOISTURE, (IN RUSSIAN),
For primary bibliographic entry see Field 02I.
W74-01783

SEWAGE FARMING,
Washington Univ., St. Louis, Mo., Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 05D.
W74-01863

AVAILABILITY OF PHOSPHORUS AND NITROGEN IN ACID SOIL IN PRESENCE OF CALCIUM SALTS,
Allahabad Univ. (India). Dept. of Chemistry.
S. Ali, S. K. De, and S. Chandra.
U A R J Soil Sci. Vol 11, No 2, p 233-243. 1971.
Identifiers: *Acidic soils, *Calcium salts, *Nitrogen, *Phosphorus, Salts, *Soil chemical properties.

Additions of 9 calcium salts -CaCO3, di-calcium phosphate, calcium oxide, calcium sulfate, calcium sulfide, calcium sulfite, calcium nitrate, calcium acetate and calcium citrate increased the availability of soil N and P under different moisture conditions. In highly acidic soil the application of CaCO3 gave the maximum availability of soil P and N; the addition of calcium acetate gave maximum availability of soil P and N in slightly acidic soil. A greater time of reaction (2 mo.) and increase in the resultant pH values by the addition of calcium salts increased the availability of soil P and N.--Copyright 1973, Biological Abstracts, Inc.
W74-01896

PRESSURE-INDUCED CHANGES IN THE THERMAL AND ELECTRICAL PROPERTIES OF CLAY-WATER SYSTEMS,
Guelph Univ. (Ontario). Dept. of Soil Science.
B. D. Kay, and P. F. Low.
J Colloid Interface Sci. Vol 40, No 3, p 337-343. 1972. Illus.
Identifiers: *Clay-water systems, *Electrical properties, *Electrical properties, Pressure, *Thermal properties, *Sodium-saturated clays.

Na-saturated clays were prepared from Wyoming bentonite by 3 different methods which allowed progressively greater contamination with hydrous Al2O3. Water or dilute NaCl was added to them to form clay-water mixtures having different clay contents. The heat of compression of each mixture was determined at several pressures in a Calvet micro-calorimeter. The emf (electromotive force) between reversible electrodes in and the electrical resistance of each mixture were also determined at several pressures. When plots were made of the heat of compression, change in emf and change in electrical resistance against pressure, breaks were observed in the curves for the Na/Al-clay at concentrations greater than 3.0% by volume in the pressure range 20-30 psi. Similar breaks were not detected in the curves for the other clays. The water in the Na/Al-clay mixtures underwent a pressure-induced phase transition in the specified pressure range. Sensitive differential thermal analyses revealed that a phase transition was not induced in this water by raising its temperature to 70C.--Copyright 1973, Biological Abstracts, Inc.
W74-01903

INTERNATIONAL SYMPOSIUM ON HYDROLOGY OF WATERLOGGED AREAS (MEZHDUNARODNYY SIMPOZIUM PO GIDROLOGII ZABOLOCHENNYKH TERRITORIY),
I. Ye. Kuksin.
Vodnyye Resursy, No 3, p 208-210, 1972.

Descriptors: *Conferences, *Hydrology, *Saturated soils, Bogs, Peat, Temperate, Water balance, Land reclamation, Drainage, *Drainage systems, Drainage effects, Investigations, Forecasting.
Identifiers: USSR (Belorussia).

An international symposium on hydrology of waterlogged areas was held in Minsk, July 17-21, 1972. The symposium was conducted in accordance with the program of the International Hydrological Decade and was organized by UNESCO in collaboration with the Belorussian Republic and sponsored by the International Association of Hydrological Sciences. Conference participants numbered over 100 scientists and specialits from Hungary, the German Democratic Republic, Ireland, the Netherlands, Norway, Poland, Rumania, the USSR, the United States, Finland, and the German Federal Republic. Reports of the conference were classified into 3 categories: (1) methods and results of hydrological, climatic, geological, and soil-botanical investigations of waterlogged areas of the temperate zone; (2) methods and results of water-balance computations, and their use in designing drainage systems in the temperate zone; and (3) transformation of the water regimen of waterlogged areas of the temperate zone by modern reclamation practices, and a forecast of its effect on the meteorological regime of the environment. The proceedings of the symposium will be published. (Josefson-USGS)
W74-01963

OPTIMUM CONTROL OF IRRIGATION WATER APPLICATION,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 03F.
W74-01973

A NEW ELECTRICAL SOIL-MOISTURE MEASURING UNIT,
Michigan State Univ., East Lansing. Dept. of Soil Science.
G. Bouyoucos.
Soil Sci. Vol 114, No 6, p 493. 1972. Illus.
Identifiers: *Electrical equipment, *Soil moisture, *Measurement.

The newly perfected nylon moisture block measures soil moisture satisfactorily. It gives readings from 20 ohms at near saturation to 3,000,000 ohms at the air-dry state. It measures the moisture content of coils from slightly above fluid capacity to conditions approximating the air-dry state. A description of this nylon block is given. This new apparatus is not intended to replace the original plaster of paris block.--Copyright 1973, Biological Abstracts, Inc.
W74-01978

PLANT-AVAILABLE AND EXTRACTABLE SULFUR IN SOME SOILS OF ENGLAND AND WALES,
Grassland Research Inst., Hurley (England). Soils Plant Nutrition Div.
L. H. P. Jones, D. W. Cowling, and D. R. Lockyer.
Soil Sci. Vol 114, No 2, p 104-114. 1972. Illus.
Identifiers: England, Fertilizers, Grass, Nutrition, Perennial, Rye, *Soils, *Sulfur, *United Kingdom, Wales.

Investigations by soil chemical and pot-culture procedures of the S status of 16 soils of England and Wales are described. The S supplying power of the soils, i.e., available S, was assessed by measuring the total uptake by perennial ryegrass in pots in a growth chamber with the air filtered to exclude gaseous S compounds. Total uptake comprised the S in 4 successive harvests of tops plus that in the roots after the 4th harvest. The available S was generally greater in soils of the wet region than in those of the dry region and was highly correlated with the amounts of soluble plus adsorbed sulfate originally present in the soils and extractable with potassium phosphate solution. The decreases in this fraction during the growth period accounted for 80-94% of the available S, and release through mineralization contributed the remainder. The higher levels of available S in the soils of the wet region were due mainly to their greater retention of sulfate by adsorption rather than to any difference in previous S inputs through rainfall and fertilizers; the combined average of these inputs is estimated to be about the same for the 2 regions. The pot-culture experiment included a treatment with added sulfate S and the yield of dry matter at each of the harvests was used as the basis for calculating the reduction in yield due to S deficiency. Significant reductions of more than 10% were generally associated with S contents in the tops of 0.17% or less. The ratios of total N to total S in the tops ranged 8-80, and were generally less than 15 until yields were reduced by S deficiency.--Copyright 1973, Biological Abstracts, Inc.
W74-01997

MOBILITY OF ELEMENTS IN SOIL PROFILES OF MONT ST. HILAIRE, QUEBEC, CANADA, UNDER VARYING SLOPES AND DRAINAGE CONDITIONS,
Karachi Univ. (Pakistan). Dept. of Geology.
K. A. Mallick.
Nucleus (Karachi). Vol 9, No 1/2, p 85-96. 1972. Illus.
Identifiers: Calcium, *Canada (Mont St. Hilaire, Que.), *Drainage, Mobility, *Slopes, *Soil profiles, Zinc.

The soils are developed from underlying rocks, with some exceptions in the contact zones. The effect of drainage conditions on the enrichment and depletion of the relatively mobile elements in the soil profiles of Mont St. Hilaire is very pronounced. In conditions of poor drainage the concentration of Zn, Fe, Mn and Ca in the A-horizon is higher or equal to that in the B-horizon of soil profiles and the reverse is true in well drained conditions. In the poorly drained areas, the weight percentage of the fine fraction is nearly equal to or more than the coarse grained fraction of the sample. The relatively higher weight percentage of the fine fraction in the poorly drained areas is not affected appreciably by changes in the slope. In general the weight percentage of the finer fraction is much greater in essexite, igneous breccia and hornfels than in syenitic rocks, probably because of comparatively rapid disintegration and decomposition of mafic minerals. Some of the samples from the igneous breccia area show wide variation in the enrichment and depletion of Ca and Zn--Copyright 1973, Biological Abstracts, Inc.
W74-02007

SOME CHARACTERISTICS OF SOIL AND PERENNIAL VEGETATION IN NORTHERN MOJAVE DESERT AREAS OF THE NEVADA TEST SITE,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 05B.
W74-02024

CONTRIBUTION TO THE STUDY OF THE MIGRATION OF RUTHENIUM-106 IN SOILS,
Commissariat a l'Energie Atomique, Cadarache (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 05B.
W74-02051

DISTRIBUTION OF RA-226 IN SOIL AND WATER,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W74-02057

THERMODYNAMICS OF SWELLING CLAY--WATER SYSTEMS,
Sonoma State Coll., Rohnert Part, Calif.
G. Sposito.
Soil Sci. Vol 114, No 4, p 243-249. 1972, Illus.
Identifiers: *Clay-water system, *Swelling, Thermodynamics, *Soils.

The swelling of clay-water systems can be accounted for directly in macroscopic terms. Predictions of the volume change upon swelling and the swelling pressure are possible, when non-equilibrium effects are small, in terms of unambiguous, macroscopic parameters alone. That "geometry factor" is not relevant to a purely macroscopic description of these materials is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-02071

THE RELATION BETWEEN MOISTURE MEASUREMENTS WITH A NEUTRON PROBE AND SOIL TEXTURE,
Hebrew Univ., Jerusalem (Israel).
B. Gornat, and D. Goldberg.

Soil Sci. Vol 114, No 4, p 254-258. 1972, Illus.
Identifiers: Measurements, *Moisture measurement, *Neutron probe, *Soil texture, Soil-water relationships.

The permissible depth to which a neutron probe may be lowered between 2 consecutive soil moisture determinations without losing accuracy is influenced by soil texture. In situ measurements made in a sandy soil using increments 15, 30, 45 or 60 cm thick, gave the same average soil moisture content for the entire profile. In a fine-textured soil, sampling by 30-cm increments produced a deviation double that obtained in sand using 60-cm increments.--Copyright 1973, Biological Abstracts, Inc.
W74-02074

LAND MANAGEMENT IN RED (CHALKA) SOILS OF TELENGANA,
Indian Council of Agricultural Research, Hyderabad. Southern Regional Soil Conservation Research Centre.
For primary bibliographic entry see Field 03F.
W74-02086

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENTS IN SANDS: 1. SOIL TRANSFORMATIONS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-02147

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENT IN SANDS: II. GROUND WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-02148

MOVEMENT OF TOXAPHENE AND FLUOMETURON THROUGH DUNBAR SOIL TO UNDERLYING GROUND WATER,
Clemson Univ., S.C.
For primary bibliographic entry see Field 05B.
W74-02149

NITRATE IN SURFACE AND SUBSURFACE FLOW FROM A SMALL AGRICULTURAL WATERSHED,
Agricultural Research Service, Watkinsville, Ga.
For primary bibliographic entry see Field 05B.
W74-02150

2H. Lakes

EFFECT OF BENTHIC SEDIMENTS ON THE OXYGEN CYCLE IN PONDS, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Zoologii i Parazitologii.
V. S. Polishchuk.
Uzb Biol Zh. Vol 16, No 3, p 48-50, 1972, Illus.
Identifiers: *Benthic sediments, *Oxygen absorption (Benthos), Ponds, Sediments, Absorption.

The oxygen absorption by benthic buildup in ponds was a function of both the layer thickness and the season. The rate of oxygen absorption is highest during the June-Aug. period when the water temperature is high. Muddy bottoms absorb oxygen more readily than sandy ones.--Copyright 1973, Biological Abstracts, Inc.
W74-01660

RADAR INVESTIGATION OF SUMMERTIME LAND/LAKE RAINFALL VARIATIONS OVER LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Dept. of Geography.
For primary bibliographic entry see Field 02B.
W74-01661

ORGANIC MATTER AND ELEMENTS IN THE HYDROLOGIC REGIMEN OF VOLGA RESERVOIRS (ORGANICHESKOYE VESHCHESTVO I ELEMENTY GIDROLOGICHESKOGO REZHIMA VOLZHSKIKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01723

ORGANIC MATTER IN WATER OF LAKE ONEGA AND SOME WATER BODIES OF THE VOLGA-BALTIC WATERWAY IN THE SUMMER OF 1968 (ORGANICHESKOYE VESHCHESTVO V VODE ONEZHSKOGO OZERA I NEKOTORYKH VODOYEMOV VOLGO-BALTIYSKOGO VODNOGE PUTI LETOM 1968 G.),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01725

CONTENT AND DISTRIBUTION OF NITROGEN COMPOUNDS IN THE RYBINSK RESERVOIR IN SUMMER AND AUTUMN (SODERZHANIYE I RASPREDELENIYE SOYEDINENIY AZOTA V RYBINSKOM VODOKHRANILISHCHE V LETNE-OSENNIY PERIOD),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01726

SOME FEATURES OF THE HYDROLOGIC REGIMEN OF SARATOV RESERVOIR (NEKOTORYYE CHERTY GIDROLOGICHESKOGO REZHIMA SARATOVSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 04A.
W74-01728

BAROCLINIC BOUNDARY CURRENTS AND LONG EDGE-WAVES IN BASINS WITH SLOPING SHORES,
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
G. T. Csanady.
Journal of Physical Oceanography, Vol 1, No 2, p 92-104, April 1971. 9 fig, 13 ref, 3 append.

Descriptors: Coasts, Shallow water, *Shores, Beaches, Thermocline, *Boundary processes, *Waves (Water), *Great Lakes.
Identifiers: *Edge-waves, Near shore processes, Kelvin waves, *Baroclinic motions, Boundary currents.

Earlier work on baroclinic 'coastal jets' and Kelvin waves in constant-depth basins is extended to basins with sloping shores. Baroclinic coastal jets are again found to be set up by an inflow or outflow of water to or from the shore zone, but the center of these is now somewhat displaced from shore (under typical Great Lakes conditions by a distance of order 10 km). Shore-bound waves (edge-waves) of long wavelength are found to be possible only at frequencies below the inertial and are associated with quasi-geostrophic flow. Moreover, these waves propagate in the same sense as Kelvin waves. However, an infinite sequence of such edge-waves appear, replacing the simple Kelvin waves of the constant-depth model (of given wave-length). The frequency of all of these is well below the Kelvin wave frequency in a constant depth basin. The structure of the basic mode is very similar to that in a constant-depth basin, but that of the higher modes becomes progressively more complex, containing bands of opposing currents. (Sinha-OEIS)
W74-01733

WEIGHT, SIZE, AND CHEMICAL COMPOSITION OF SOME FRESHWATER ZOOPLANKTERS: DAPHNIA HYALINA (LEYDIG),
European Atomic Energy Community, Ispra (Italy). Biology Div.
M. F. Baudouin, and O. Ravera.
Limnol Oceanogr, Vol 17, No 4, p 645-649, 1972, Illus.
Identifiers: Chemical composition, Daphnia-hyalina, *Italy (Lago Monate), Plankters, Size, Weight, *Zooplankton, Minerals.

Size, dry weight, ash, and concentration of C, H, N, P, and Ca of D. hyalina from Lago Monate (northern Italy) were investigated. The concentration of the elements varies with age of the individuals. Eggs have the maximum concentration of C and H, the newborn of P, and the young of N. No seasonal variation was observed for individuals of the same size.--Copyright 1973, Biological Abstracts, Inc.
W74-01745

DYNAMIC STATUS OF PRIMARY PRODUCTION IN LAKE YUNOKO, A SMALL EUTROPHIC SUBALPINE LAKE IN CENTRAL JAPAN,
Tokyo Univ. (Japan). Botanical Inst.
For primary bibliographic entry see Field 05C.
W74-01750

PHYTOPLANKTON OF THE UPPER YENISEI BEFORE THE SAYANY RESERVOIR FORMATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
For primary bibliographic entry see Field 05C.
W74-01757

MICROPHYTOBENTHOS AND OVERGROWING SOME RESERVOIRS IN TURKMENIA, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Askhabad. Institut Botaniki.
For primary bibliographic entry see Field 05C.
W74-01758

FORAMINIFERS OF LAKE ISSYK-KULL AND GROUNDWATERS OF CENTRAL ASIA, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
A. I. Yankovskaya, and V. I. Mikhalevich.
Dokl Akad Nauk SSSR Ser Biol. Vol 205, No 4, p 1005-1008, 1972. Illus.
Identifiers: Asia, Bristeniolla-Macrostoma, Elphidiella-Brotzkajae, *Foraminifers, *Groundwater, Jadammina-Zernovi, Lakes, *USSR (Lake Issyk-Kull).

Descriptions are given of specimens of Bristeniolla macrostoma, Jadammina zernovi and Elphidiella brotzkajae collected from Lake Issyk-Kul (USSR) and groundwaters of Central Asia.--Copyright 1973, Biological Abstracts, Inc.
W74-01763

EFFECT OF CERTAIN PHYSIOCOCHEMICAL FACTORS ON THE PLANKTON OF THE NANGAL LAKE,
Punjab Univ., Chandigarh (India). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-01778

NUTRIENTS IN NATURAL WATERS.
For primary bibliographic entry see Field 05C.
W74-01798

CHANGES IN C, N, P, AND S IN THE LAST 140 YEARS IN THREE CORES FROM LAKES ONTARIO, ERIE, AND HURON,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01805

EFFECTS OF SEDIMENT DIAGENESIS AND REGENERATION OF PHOSPHORUS WITH SPECIAL REFERENCE TO LAKES ERIE AND ONTARIO,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01806

A LIMNOLOGICAL SURVEY OF THE FRESHWATER COASTAL LAKES OF EAST GIPPSLAND, VICTORIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-01813

PLANKTON SUCCESSION IN A NEWFOUNDLAND LAKE,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01818

AN APPROACH TO THE MODELING OF LAKES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05B.
W74-01819

LIMNOLOGICAL STUDIES ON A SOUTHEAST TEXAS MEANDER SCAR LAKE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01828

COPRECIPITATION OF PHOSPHATE WITH CARBONATES IN A MARL LAKE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
A. Otsuki, and R. G. Wetzel.
Limnol Oceanogr. Vol 17, No 5, p 763-766. 1972. Illus.
Identifiers: *Carbonates, Lakes, *Marl lakes, *Phosphates, Photosynthesis, Precipitation.

High concentrations of phosphate ion precipitate with carbonates by simple coprecipitation as the pH of marl lake water is increased. High pH microenvironments associated with photosynthesis probably induce phosphate-carbonate precipitation, which in turn functions as one of several indirect density-dependent population controls.--Copyright 1973, Biological Abstracts, Inc.
W74-01843

BIOLOGY OF HARPACTICELLA INOPINATA (COPEPODA, HARPACTICOIDAE) IN LAKE BAIKAL, (IN RUSSIAN),
Biologo-Geograficheskii Nauchno-Issledovatelskii Institut, Irkutsk (USSR).
G. L. Okuneva.
Zool Zh. Vol 5, No 11, P 1637-1644. 1972. Illus. (English summary).
Identifiers: Biology, Copepoda, Harpacticella-Inopinata, *Harpacticoidae, Lakes, Longevity, *USSR (Lake Baidal).

The main concentrations of H. inopinata are located on the stony ground of the littoral zone (0-5 m); in the sublittoral zone (20-70 m) the population density is low; below 100 m only single specimens occur in Lake Baikal, USSR. During the year, the population density and biomass of H. inopinata suffer sharp fluctions. The first maximum of population density is in June-July, the second in Aug.-Sept. The maximum of population density of adult specimens reflects the maturation of new generations accompanied by the appearance of large numbers of young specimens. On the basis of laboratory observations, the duration of development from larva to adult at the water temperature from 8 to 10C varies from 39 to 48 days. The longevity of life of females is not less than 3 to 4 mo.Copright 1973, Biological Abstracts, Inc.
W74-01883

SEDIMENTATION OF SUSPENDED MATTER BY DREISSENA POLYMORPHA PALLAS AND ITS SUBSEQUENT UTILIZATION BY CHIRONOMIDAE LARVA,
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
For primary bibliographic entry see Field 05C.
W74-01904

REPORT ON OSCILLATORIA (SUBGENUS SPIRULINA) PLANTENSIS (NORDST.) BOURRELLY (CYANOPHYTA) IN CHAD, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).
For primary bibliographic entry see Field 05C.
W74-01905

PALEOHYDROLOGIC IMPLICATIONS OF SOME PLUVIAL LAKES IN NORTHWESTERN NEW SOUTH WALES, AUSTRALIA,
Wisconsin Univ., Milwaukee. Dept. of Geography.
G. H. Dury.
Geological Society of America Bulletin, Vol 84, No 11, p 3663-3676, November 1973. 12 fig, 3 tab, 32 ref.

Descriptors: *Paleoclimatology, *Pleistocene epoch, *Lakes, *Australia, Evaporation, Precipitation (Atmospheric), Water balance, Paleohydrology, Paleolimnology.

Some internally draining lakes in northwestern New South Wales, Australia, are contained in structural basins but owe their lack of external outlets to arid climate. Former high lake shorelines are defined in part by precipitated crusts or by deltas. Radiocarbon dated suggests that the high lake stands occurred not later than about 14,500 B.P. Whether or not the lakes existed at the time of maximum cold is uncertain; but they were associated with low paleotemperatures. Even in the lowest observed or estimated range of evapotranspiration, the precipitation equations indicate former precipitation about 50% greater than that of today. (Knapp-USGS)
W74-01959

OBSERVATIONS OF BEACH CUSPS AT MONO LAKE, CALIFORNIA,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 02J.
W74-01961

SOME NATURAL PHYSICAL PROCESSES AFFECTING THE RECOVERY OF THE GREAT LAKES,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 05B.
W74-01974

BACTERIOLOGICAL STUDIES ON GRAVEL PIT LAKES (BAKTERIOLOGISCHE UNTERSUCHUNGEN AN BAGGERSEEN),
For primary bibliographic entry see Field 05A.
W74-01976

THE MAJOR IONS OF SOME LAKES AND OTHER WATERS IN QUEENSLAND, AUSTRALIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
I. A. E. Bayly, and W. D. Williams.
Aust J Mar Freshwater Res. Vol 23 No 2, p 121-131. 1972. Illus.
Identifiers: *Australia (Queensland), Bicarbonates, *Chlorides, *Ions, Lakes, Salinity, *Sodium.

Data relating to major inorganic ions are presented for 33 water bodies in eastern Queensland. Three of these draw supplies from underground sources, the remainder are lakes, lagoons, and an impoundment. The localities fall into 5 regions: a central-eastern region between Barcaldine and Charters Towers (9 localities); the Atherton Tablelands (8 localities); the coast near Cape Bedford (5 localities); the region between the Great Dividing Range and Ingham (7 localities) and near Rockhampton (4 localities). In the first region the localities are fresh except for Lake Buchanan; Na is the dominant cation in all cases; Cl clearly dominates the anions in Lake Buchanan, the pools peripheral to Lake Galilee, and the spring sampled, but is approximately co-dominant with bicarbonate in the remaining localities supplied by surface waters. In the second and fourth regions all the waters have low salinities (<100 or <300 ppm, respectively), divalent cations and bicarbonate are the most important ions, and sulfate is present in negligible amounts. In the third region all localities are very dilute (<60 ppm salinity) and Na and Cl dominate the ions; pH values are very low as also are concentrations of bicarbonate. In the fifth region Na and Cl ions again dominate but not to the same extent, and bicarbonate values are higher; salinities range from 106-607 ppm.--Copyright 1973, Biological Abstracts, Inc.
W74-01979

MERCURY POLLUTION OF LAKE ERIE ECOSPHERE,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 05B.
W74-01985

PHYSICAL AND BIOLOGICAL DISPERSION OF THE HYPOLIMNETIC PHOSPHORUS OF A BOG LAKE SYSTEM,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 05B.
W74-02047

AGE AND GROWTH OF THE CISCO IN ONEIDA LAKE, NEW YORK,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
D. B. Smith.
N Y Fish Game. Vol 19, No 1, p 83-91. 1972.
Identifiers: *Age, *Cisco, Coregonus-Artedii, *Growth, Lakes, Mortality, *New York (Oneida Lakes), Annulus (False).

Age and growth determinations were made from scales of ciscoes (Coregonus artedii) collected from 1960-1970. A false annulus occurred each calendar year during the months of highest water temperature and lowest dissolved oxygen levels. Predominance of age I and II ciscoes indicated high mortality rates in the population. Possible causes of false annulus formation and the high mortality rate are discussed.--Copyright 1973, Biological Abstracts, Inc.

W74-02072

OCCURRENCE OF EUBOTHRIUM CRASSUM (BLOCH, 1779) (CESTODA: - PSEUDOPHYLLIDEA) IN BROWN TROUT SALMO TRUTTA L., AND RAINBOW TROUT S. GAIRDNERI RICHARDSON, 1836, FROM HAMNINGFIELD RESERVOIR, ESSEX,
Marine Lab., Aberdeen (Scotland).
R. Wootten.
J Helminthol. Vol 46, No 4, p 327-339. 1972.
Identifiers: *Brown trout, *Cestoda, Copepod, Eubothrium-Crassum, Pseudophyllaidea, *Rainbow trout, Reservoirs, Salmo-Gairdneri, Salmo-Trutta, *United Kingdom (Essex).

Both brown trout, S. trutta, and rainbow trout, S. gairdneri, from Hamningfield Reservoir, Essex, Great Britain and adjacent rearing channels, harbored E. crassum throughout 1968. There was no seasonal cycle of occurrence or maturation of the cestode. Brown trout (2+) introduced into the reservoir in the spring acquired heavy infestations during their first summer in the reservoir. Most of these cestodes are apparently lost from fish which are in the reservoir for 1 yr or more. Possible reasons for this loss are discussed. Rainbow trout from the rearing channels and reservoir were lightly infested. There was no heavy infestation of 2+ fish introduced into the reservoir in the spring. Speculations are made on reasons for the observed differences in infestation of brown and rainbow trout. There was an increase in mean length of E. crassum with increasing maturity. More cestodes were mature or gravid in rainbow trout than in brown trout and their mean lengths were greater. Plerocercoids of E. crassum were apparently absent from potential fish 2nd intermediate hosts in the reservoir, but were present in rainbow trout from the rearing channels (from which other fish species were excluded). The life cycle of E. crassum in Hamningfield Reservoir may involve only a single copepod intermediate host.--Copyright 1973, Biological Abstracts, Inc.
W74-02091

FURTHER STUDIES ON THE HYDROGRAPHY AND CHEMISTRY OF LAKE MANZALAH,
Alexandria Inst. of Oceanography and Fisheries (Egypt).
S. D. Wahby, S. F. Youssef, and N. F. Bishara.
Bull Inst Oceanogr Fish. 2: p 399-422. 1972. Illus.
Identifiers: *Hydrography, Lakes, *United Arab Republic (Lake Manzalah), *Lake chemistry.

The hydrography and chemistry of Lake Manzalah, United Arab Republic waters were studied during 1967 after the construction of the Aswan High Dam. The freshwater formerly discharged through the Nile connections during flood time is thought to be compensated by the increased amount of drainage water discharged at the southern and western parts of the lake. The nutrient level of the lake during 1963 and 1967 is compared.--Copyright 1973, Biological Abstracts, Inc.
W74-02096

CONTRIBUTION TO THE LIMNOLOGY OF HIGH MOUNTAIN LAKES IN CENTRAL AMERICA, (IN GERMAN),
Vienna Univ. (Austria).
H. Loeffler.
Int Rev Gesamten Hydrobiol. Vol 57, No 3, p 397-408. 1972. Illus.
Identifiers: *Algae, Central America, Caldocera, Copepods, *Costa Riva, *Distribution (Paleogeographic), *Guatemala, Lakes, Limnology, Mountain lakes, *Harpacticoids.

Tropical high mountain lakes of Central America, confined to Guatemala and Costa Rica, are mainly of the Paramo type, the only exception being freshwater on the karstic high plateau of the Cordillera de los Cuchumantanes. With respect to their low content of electrolytes and their algal composition, most of them are similar and resemble lakes and freshwater localities in bordering Mexico and South America (Nevadas de Santa Marta and Merida). In contrast to the algae and Cladocera, the harpacticoids and to a lesser extent, the calanoids and cyclopoids of Central America high mountain lakes have a distribution which, to an astonishing degree, reflects paleogeographic facts. Passive dispersal must have played only a very subordinate role in the distribution of Central American high mountain harpacticoids.--Copyright 1973, Biological Abstracts, Inc.
W74-02107

FEEDING OF THE FERGANA BREAM (ABRAMIS BRAMA BERGI NATIO FERGANENSIS MAKSUNOV), (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
L. V. Kondur.
Izv Akad Nauk Tadzh SSR Otd Biol Nauk. 2. p 47-52, 1972, Illus.
Identifiers: Abramis-brama-bergi-ferganensis, Age, *Bream (Fergana), Competition, *Feeding, Locale, Season, *USSR (Tadzhikistan), Weight, Reservoirs.

The weight characteristics of the feeding of the Fergana (Abramis brama bergi natio ferganensis) inhabiting the Kairak-Kum reservoir (Tadzhikistan, USSR) are given. The intestines of 130 fishes 7-28 cm long were investigated. The seasonal, local, and age-related differences in the feeding of this species were traced. The food supply of this species and the competitive relations for food with other fish species are shown.--Copyright 1973, Biological Abstracts, Inc.
W74-02111

DETERMINATION OF VITAMIN B12, THIAMINE AND BIOTIN IN LAKE TAHOE WATERS USING MODIFIED MARINE BIOASSAY TECHNIQUES,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 05C.
W74-02118

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W74-02139

2I. Water in Plants

BIBLIOGRAPHY ON OPTIMIZATION OF IRRIGATION SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03F.
W74-01657

THE DIFFUSION RESISTANCE AND WATER STATUS OF LEAVES OF BETA VULGARIS,
Nottingham Univ. (England). Dept. of Physiology and Environmental Studies.
For primary bibliographic entry see Field 03F.
W74-01734

SOIL PROPERTIES IN RELATION TO THE GROWTH AND YIELD OF OIL PALM (ELAEIS GUINEENSIS JACQ.) IN SURINAM,
Landbouwproefstation, Paramaribo (Surinam).
For primary bibliographic entry see Field 02G.
W74-01736

THE INFLUENCE OF RAINFALL ON THE POPULATION OF NEMATODES IN BANANA FIELD,
Pakistan Council of Scientific and Industrial Research, Karachi.
M. Saeed, and S. H. Ashrafi.
Pak J Sci Ind Res, Vol 14, No 4/5, p 403-404, 1971.
Identifiers: *Banana fields, *Nematodes, *Rainfall, Animal population.

The population of stylet and non-stylet-bearing nematodes was high before the rains. After 6-in. rains the population of stylet-bearing nematodes was found to be 1/5 of the population before the rains. The population of non-stylet-bearing nematodes was also affected, being reduced by almost one half.--Copyright 1973, Biological Abstracts, Inc.
W74-01737

CONCEPTS IN VEGETATION/SOIL SYSTEM DYNAMICS: POST STEADY-STATE,
Australian National Univ., Canberra. Dept. of Forestry.
G. N. Park.
Tuatara, Vol 19, No 3, p 105-123, 1972.
Identifiers: Diversity, *Forests, Moisture, Soil, Species, *Vegetation, *Soil-water-plant relationships.

Terminology and concepts of temporal changes in the vegetation/soil system are reviewed. The post steady-state is any development beyond the situation in which a forest is maintaining both a healthy structure and constant composition over a soil with which it has an adequate nutrient balance and from which advanced gleying and swamping and loss of essential elements are absent. Literature is reviewed relating to the close relationship among deteriorating forest structure, increasing species diversity and increasingly wetter, less aerated and more organic soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01739

FOOD SPECIALIZATION BY INDIVIDUAL TROUT,
J. E. Bryan, and P. A. Larkin.
J Fish Res Board Can, Vol 29, No 11, p 1615-1624, 1972, Illus.
Identifiers: *Fish food, Salmo-clarki, Salmo-gairdneri, Salvelinus-fontinalis, Specialization, *Trout.

Analyses of stomach contents showed that the kinds of prey eaten by brook trout (Salvelinus fontinalis), cut-throat trout (Salmo clarki), and rainbow trout (Salmo gairdneri) were seldom distributed at random among the individuals. Repeated observation of food eaten by individuals in a stream and ponds showed that prey types were eaten in proportions which were characteristic for an individual. Specialization occurred on several different kinds of prey. Although the degree of specialization was higher during shorter intervals, some specialization may have persisted for half a year. There were no striking correlations between degree of specialization and other individual properties such as size, growth rate, weight of food, number of food items, previous specialization, or area of recapture. In addition to the observations on trout in relatively undisturbed habitats, a field experiment was conducted using laboratory-reared rainbow trout held in small ponds. The food of each trout in the experiments was sampled repeatedly. In analysis of variance, interaction among the individuals and kinds of prey eaten showed that food specialization occurred. Both the absolute and relative abundance of potential prey were constant during the experiment.--Copyright 1973, Biological Abstracts, Inc.
W74-01743

CLOUD MOISTURE INTERCEPTION IN THE LUQUILLO MOUNTAINS OF PUERTO RICO,
P. L. Weaver.

Caribb J Sci, Vol 12, No 3/4, p 129-144, 1972, Illus.
Identifiers: *Cloud moisture, Hardwoods, Interception, Moisture, Mountains, *Puerto Rico (Luquillo Mountains), Regressions, Vegetation, *Trees.

'Pico del Este' in the cloud forest of the Luquillo Mountains of Puerto Rico was studied in 3 zones: the windward, ridge and leeward. Components of the arboreal vegetation, humidity and temperature was recorded, Throughfall was measured in 180 fixed No. 10 cans; stemflow, on 12 trees of varying species and dbh (diameter breast height) class. Throughfall regressions on rainfall were significant within and among working zones. Grouped stemflow regressions on rainfall averaged 5.1, 9.6 and 2.8% of rainfall on the windward, ridge and leeward, respectively. Total precipitation was estimated at 99 to 106% of rainfall, representing a net gain of moisture from 0.09 to 0.15 in., over that received in the eastern hardwoods, per inch of rainfall.--Copyright 1973, Biological Abstracts, Inc.
W74-01747

ASSOCIATION OF SOME AQUATIC PLANTS OF THE LOWER AMUR WITH DEFINITE DEPTHS OF WATER, (IN RUSSIAN),
M. P. Shilov.
Byull Mosk O-Va Ispyt Prir Otd Biol. Vol 77, No 2, p 96-103, 1972. Illus. (English summary).
Identifiers: *Aquatic plants, Association, Nymphoides-Peltatum, Potamogeton-Perfoliatus, Sagittaria-Natans, *USSR (Lower Amur), Utricularia-Vulgaris, *Water depth.

A characteristic is given of the association of some of the most widely distributed aquatic plants of the Lower Amur (USSR) (Nymphoides peltatum, Sagitaria natans, Utricularia vulgaris, Potamogeton perfoliatus, etc.) with definite depths of water. The predominant, optimum, minimum and maximum depths of their growth are determined, as well as the critical depths where the frequency of their occurrence shows a sharp decrease. The concept is introduced of threshold projective coverages, at which either a sharp decrease or an increase in the frequency of occurrence of aquatic plants is observed.--Copyright 1973, Biological Abstracts, Inc.
W74-01751

ABSORPTION OF WATER VAPOR BY THE ABOVEGROUND PARTS OF THE KARAKUM DESERT PLANTS, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Botanicheskii Institut.
V. M. Sveshnikova.
Bot Zh. Vol 57, No 8, p 880-888, 1972. (English summary).
Identifiers: *Absorption, *Desert plants, Dicots, Moisture, Soils, *USSR (Karakum), *Water vapor.

The purpose was the assessment of the absorption of atmospheric water vapor by leaves or shoots of the Karakum desert (USSR) plants (Haloxylon aphyllum, H. persicum, Salsola richteri, Ammodendron conollyi, Calligonum caput medusae, S. subaphylla, Ephedra strobilacea, Smirnowia turkestana, Convulvulus korolkovii, Heliotropium arguzioides, Horaninovia ulcina, Kochia schrenkiana, Tamarix ramosisima) which suffer extreme arid conditions. Several authors have proved the substantial significance of processes of water vapor condensation in different layers of the soil profile for the aquatic balance of Kara-Kum soils. Experiments for studying the absorption of water vapor by the 13 species of widespread plants, at different periods of vegetational season and at different temperature were carried out. The majority of species proved to be capable of absorbing water vapor from the atmosphere, but species are clearly differentiated according to the quantity of vapor absorbed and the degree of the absorption process constancy.--Copyright 1973, Biological Abstracts, Inc.
W74-01760

SECONDARY LEAF FALL OF HEVEA BRASILIENSIS: METEOROLOGICAL AND OTHER FACTORS AFFECTING INFECTION BY COLLETOTRICHUM GLOEOSPORIOIDES,
Rubber Research Inst. of Malaya, Kuala Lumpur (Malaysia).
R. L. Wastie.
Ann Appl Biol. Vol 72, No 3, p 283-293, 1972.
Identifiers: Abrasion, Age, Bacteria, *Colletotrichum-gloeosporioides, *Hevea-brasiliensis, Humidity, *Infection, *Leaf fall, Meteorological studies, Temperature, Wetness...

The lower leaf surface of H. brasiliensis was more susceptible to infection by C. gloeosporioides than the upper. Few lesions were produced if spore drops on susceptible leaves were allowed to dry. Lesion development after 72 hr was quickest at 21C, slower at 26.5C and was stopped at 32C, probably because of bacteria in the inoculation drop. On leaflets aged 7 days from bud-burst, the effective spore dose for 50% of leaflets infected (ED50 (median effective dose)) after 16 hr incubation was 260 spores and after 46 hr, 120 spores/infection droplet; the minimum ED50 for the upper leaf surface was about 4 spores mm2. Leaflets 15 days old, which are normally resistant, were rendered susceptible by abrading the surface with carborundum powder. Spores caught in a Hirst spore trap reached a daily maximum at 23 hr, at rates of up to 440 spores/m3 air/hr, but fell to low concentrations as the humidity dropped during the daytime, and also during rain. There was some correlation between disease severity and duration of 97-100% relative humidity, and moderate to severe defoliation of clone PB86 occurred when this reached 13.5 hr/day. Rainfall increases infection by prolonging the period of atmospheric saturation and leaf wetness.--Copyright 1973, Biological Abstracts, Inc.
W74-01764

DIURNAL FLUCTUATIONS OF WATER CONTENT DURING VEGETATIVE CYCLE OF AN HOMOGENOUS PLANT POPULATION: LINUM USITATISSIMUM L. VAR. REINA, (IN FRENCH),
Y. Boyer.
Oecol Plant. Vol 7, No 3, p 259-278, 1972. Illus. (English summary).
Identifiers: *Diurnal fluctuations, Drought, Homogeneous plants, *Linum-Usitatissimum, Plant population, *Vegetative cycle.

The diurnal flucturations of the water content of plants in situ at different development stages and growing under natural conditions was studied by a non-destructive method. The experimental plots were sown at a few weeks' interval; thus a comparison of the behavior of plants at corresponding development stages under different environmental conditions could be made. The variability of the behavior depended on physiological stage and on the present climatic conditions (possibly on the former climatic conditions). In some cases of atmospheric and adaphic drought, the aged stems lost water apparently to the young stems. The lower part of the flax stems may act as storage organs.--Copyright 1973, Biological Abstracts, Inc.
W74-01767

ENTRY OF CHEMICAL ELEMENTS--ANALOGUES (STRONTIUM-90-CALCIUM AND CESIUM-137-POTASSIUM) INTO PLANTS IN RELATION TO SOIL MOISTURE, (IN RUSSIAN),
E. N. Karavaeva, and I. V. Molchanova.
Ekologiya. Vol 2, No 5, p 96-98. 1971.
Identifiers: Bromus-Inermis, Calcium, *Cesium-137, Chemical elements, Festuca-Arundinacea, Festuca-Pratensis, Festuca-Rubra, Moisture, Potassium, *Soil moisture, *Strontium-90, *Soil-water-plant relationships.

The presence of 90Sr relative to its chemical analogue Ca and of 137Cs relative to K was studied in relation to soil moisture in Festuca pratensis, F. arundinaceae, F. rubra and Bromus inermis on soddy-podzolic, soddy-meadow and peaty-gley soils. Solutions of Cl compounds of 90Sr and 137Cs without stable carriers were introduced into soil with a moisture content of 80, 50 and 25%. The Ca content in above-ground parts did not vary significantly according to soil, through the metabolic Ca content in soddy-meadow soil was 6 times greater than in the other soils. Soil moisture did not have a substantial effect on the 90Sr/Ca ratio in the plants, which was related only to soil type, the maximum being observed in soddy-podzolic soil. Analogous data was obtained for 137Cs-K. The maximum value for this ratio was characteristic of peaty-gley and soddy-podzolic soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01783

CIRSIO-POLYGONETUM MEADOWS IN THE PROVINCE OF SZCZECIN (IN POLISH),
Instytut Melioracji i Uzytkow Zielonych, Szczecin (Poland). Terenowy Oddzial Badawczy.
R. Kochanowska.
Fragm Florist Geobot (Krakow), Vol 17, No 1, p 129-145, 1971, Illus, English summary.
Identifiers: Cultivation, *Meadows (Cirsio-polygonetum), *Poland (Szczecin), Polygonetum, Soil humidity, Subassociations, *Mud soils.

Results are summarized of a phytosociological investigation in 1964-1966 in the meadows classed as Cirsio-Polygonetum Tx. 51. The floral material collected enabled the distinction of 4 sub-associations: Cirsio-Polygonetum caricetosum fuscae, Cirsio-Polygonetum caricetosum gracilis, Cirsio-Polygonetum avenastretosum subass. nova, Cirsio-Polygonetum deschampsietosum subass. nova. In the territory investigated (Poland), the Cirsio-Polygonetum association occurs mainly on muck-peaty soils formed in valley bogs of various types. It is more rarely encountered in muddy-gley and muddy soils. The occurrence of the particular sub-associations is connected with the stage of the muck-forming process in the peaty soils and their humidity. The initial stage of Cirsio-Polygonetum in newly established meadows originates when the meadows are not manured, and cultivated and mowed too late.--Copyright 1973, Biological Abstracts, Inc.
W74-01815

EFFECTS OF URBANIZATION ON THE SALAMANDER DESMOGNATHUS FUSCUS FUSCUS,
Emory Univ., Atlanta, Ga. Dept. of Biology.
P. N. Orser, and D. J. Shure.
Ecology, Vol 53, No 6, p 1148-1154, 1972, Illus.
Identifiers: Density, Desmognathus-fuscus-fuscus, *Georgia (Atlanta), Invertebrates, Prey, *Salamanders, *Urbanization.

Five spring-fed streams near Atlanta, Georgia, comprise an urbanization gradient ranging from severely disturbed to undisturbed conditions. Population densities of the dusky salamander, D. fuscus fuscus, were estimated within these streams and were inversely proportional to the degree of urbanization. Differences in the chemical parameters among the stations, while reflecting habitat disruption, were not considered limiting factors on salamander densities. Analysis of invertebrate prey availability indicated no significant difference among the stations. Salamander populations were significantly affected by scouring caused by increased runoff and soil erosion in disturbed areas. Differences in salamander densities were also attributed to relative stability of the bank soils and availability and dispersal of protective cover. More cohesive substrates and increased availability of ground cover at the less disturbed areas offered greater stability against erosion and better habitats for salamander burrowing. Urbanization thus creates physical instability within stream habitats. Such instability results in a

disruption of trophic structure by a reduction or loss of this major stream predator.--Copyright 1973, Biological Abstracts, Inc.
W74-01827

EFFECT OF SMOKE-PROCESSING ON MUDDY ODOR AND TASTE IN RAINBOW TROUT (SALMO GAIRDNERI),
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. G. Iredale, and D. Rigby.
J Fish Res Board Can. Vol 29, No 9, p 1365-1366. 1972.
Identifiers: *Canada, Lakes, *Odor (Muddy), *Rainbow trout, Rearing, Salmo-Gairdneri, *Smoke processing, *Taste.

Because of problems with a 'muddy' odor and taste occurring in rainbow trout reared commercially in some small prairie lakes in central Canada, full production potential is not realized. The possibility of masking the undesirable condition by smoke-processing was investigated and was a valid method of utilizing the majority of the affected fish.--Copyright 1973, Biological Abstracts, Inc.
W74-01892

INFLUENCE OF BIRDS, STONES AND SOIL ON THE ESTABLISHMENT OF PASTURE JUNIPER, JUNIPERUS COMMUNIS, AND RED CEDAR, J. VIRGINIANA IN NEW ENGLAND PASTURES,
Massachusetts Univ., Amherst. Dept. of Botany.
R. B. Livingston.
Ecology. Vol 53, No 6, p 1141-1147. 1972. Illus.
Identifiers: Birds, Dispersal, Germination, *Juniper, Juniperus-Communis, Juniperus-Virginiana, *New England, Pastures, *Red-Cedar, Seeds, Soils, Stones, Turdus-Migratorius, *Robins.

In New England the pasture juniper, J. communis, var. depressa Pursh, usually occurs in pastures adjacent to stones, whereas the red cedar, J. virginiana var. crebra Fern. et Grisc., occurs either at stoneside or in interstonal areas. In non-stony pastures, red cedar is often dominant and pasture juniper absent. Attempts were made to determine the effects of the stoneside position. During their fall migrational flights, robins, Turdus migratorius Linnaeus, feed heavily on the berries of both pasture juniper and red cedar, and are effective disseminators of the seed. During feeding periods, the robins come to rest on exposed field stones and the seed in their droppings becomes concentrated on the stones. The seeds are subsequently washed and planted into frost-heave cracks adjacent to the stones. The burial of pasture juniper seed assures their retention in a moist condition during the long, double stratification period required for their germination. Red cedar seed requires only a single cold stratification period, and this may be encountered even when seeds are planted on soil surfaces. Seedlings developing in the stoneside frost-heave crack are protected from trampling or grazing, and they receive extra moisture from their stone micro-watershed. Seedling junipers make their best growth in compacted soils, like those away from stoneside, and although birds are effective disseminators or their seed, the passage of seed through the birds gut inhibits germination. Fortuitous planting of seed on exposed stones introduces pasture juniper and red cedar to a micro-habitat that more than compensates for reduced germination and slower growth.--Copyright 1973, Biological Abstracts, Inc.
W74-01894

REPRODUCTIVE VARIATIONS IN THE ROUND-TAILED GROUND SQUIRREL AS RELATED TO WINTER RAINFALL,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. G. Reynolds, and F. Turkowski.
J Mammal. Vol 53, No 4, p 893-898. 1972. Illus.
Identifiers: *Arizona, *Ground squirrel (Roundtail), *Rainfall, Reproductive, Spermophilus-Tereticaudus, Vegetation, Winter.

Luxuriance of annual vegetation, as produced by abundant winter rainfall, seems to influence inception of breeding and litter size of round-tailed ground squirrels (Spermophilus tereticaudus) in southern Arizona.--Copyright 1973, Biological Abstract, Inc.
W74-01895

HOT SPRING MICROBIAL COMMUNITIES RECREATED IN MODIFIED 'WINOGRADSKI COLUMNS,'
Oregon Univ., Eugene. Dept. of Biology.
R. W. Castenholz.
Limnol Oceanogr. Vol 17, No 5, p 767-771. 1972. Illus.
Identifiers: *Hot springs, *Microbial communities, Spring, *Winogradski columns, Sediments, Thermal gradient.

A modification of the 'Winogradski column' in which hot spring sediment and inoculum is used has recreated the sequencie of thermophilic microbial communities that develop in the normal thermal gradient of the source spring. The mixed sediment and inoculum is packed into glass cylinders filled with spring water and a spot source of heat applied with an incandescent flood lamp or IR spot lamp. A thermal gradient from over 90C to less than 40C can be established along the sediment-glass interface. Photosynthetic and other microbial species developed in their normal range of temperature and have been maintained for several weeks or months.--Copyright 1973, Biological Abstracts, Inc.
W74-01899

OBSERVATIONS ON THE BIOLOGY OF NOTHOBRANCHIUS GUENTHERI (PFEFFER) (CYPRINODONTIDAE), AN ANNUAL FISH FROM THE COASTAL REGION OF EAST AFRICA,
Chelsea Coll. of Science and Technology, London (England). Dept. of Zoology.
R. G. Bailey.
Afr J Trop Hydrobiol Fish. Vol 1 No 2, p 33-43. 1972. Illus.
Identifiers: Africa, Aggression, Annual, Biology, Coastal regions, *Cyprinodontidae, Diet, Fish, *Nothobranchius-Guentheri, Nothobranchius-Melanospilus, Reproduction, Synonymy, *Tanzania.

N. guentheri is found in seasonal pools and streams in the coastal region of Tanzania. A population recurring annually in a pond near Kilosa was studied. Growth in length was rapid and maximum mean lengths were attained within 11-12 and 7-8 wk of hatching by males and females, respectively. Males grew larger and exhibited wider variation in length than females. N. guentheri shows clear sexual dichromatism. No significant inequality in the sex ratio was found. Females with ripe eggs were found 7-8 wk after hatching. Spawning continued throughout adult life and fecundity increased markedly with increasing lengths. In laboratory aquaria, aggressiveness between adult males was noted and females were actively driven on to the substratum preparatory to spawning. The diet of the fish pond consisted chiefly of aquatic and terrestrial insects, of which midge larvae and pupae were the most common. N. guentheri is exploited by man in the aquarist trade and for the biological control of mosquitoes. An extended redescription of the species is appended which includes N. melanospilus (Pfeffer) as a synonym.--Copyright 1973, Biological Abstracts, Inc.
W74-01981

COMPARATIVE FOOD HABITS OF FOUR SPECIES OF STREAM-DWELLING VERTEBRATES (DICAMPTODON ENSATUS, D. COPEI, COTTUS TENUIS, SALMO GAIRDNERI),
Idaho Univ., Moscow. Dept. of Entomology.
A. L. Antonelli, R. A. Nassbaum, and S. D. Smith.
Northwest Sci. Vol 46, No 4, p 277-289. 1972. Illus.
Identifiers: Comparative studies, *Cottus-tenuis, *Dicamptodon-copsi, *Dicamptodon-ensatus, *Food habits, Salmo-gairdneri, Species, Stream, Vertebrates, *Washington (Maratta Creek), *Rainbow trout.

Dicamptodon spp., S. gairdneri, and C. tenuis were collected from Maratta Creek, Washington, at monthly intervals for one year. Examination of their stomach contents relative to availability of stream organisms indicates that feeding is, for the most part, opportunistic. C. tenuis exhibits a degree of selectivity which may impose some competitive stress upon it. Dicamptodon spp. appears to feed almost entirely on benthos while S. gairdneri feed on organisms throughout the stream. The relative rarity of sculpins may suggest that competition with the other 2 vertebrates is approaching completion. Competition between Salmo and Dicamptodon spp. is relaxed somewhat by diversity of feeding habits and the probably subterranean habits of Dicamptodon spp. during part of the year. The feeding habits of the salmonid and salamanders suggest only 'partial exculsion.'--Copyright 1973, Biological Abstracts, Inc.
W74-01982

A RECORDING DEVICE FOR MEASURING RESPIRATORY MOVEMENTS OF AQUATIC INSECTS,
Waterloo Lutheran Univ. (Ontario). Dept. of Biology.
N. N. Kapoor.
Proc Entomol Soc Ont. 102: p 71-78. 1971 (1972).
Identifiers: *Aquatic insects, *Measurement, *Plecoptera, Recording devices, *Respiratory movement.

A device for detecting and measuring respiratory movements of aquatic insects (Plecoptera) was designed and constructed. The apparatus is capable of instataneously detecting and measuring undulating body movements.--Copyright 1973, Biological Abstracts, Inc.
W74-01996

PERMEABILITY OF THE CAMBIUM TO AIR IN TREES ADAPTED TO WET HABITATS,
Kentucky Univ., Lexington. Dept. of Forestry.
D. Hook, and C. L. Brown.
Bot Gaz. Vol 133, No 3, p 304-310. 1972. Illus.
Identifiers: *Cambium, Carbon dioxide, Fraxinus-Pennsylvanica, Green ash, Liquidambar-Styraciflua, Liriodendron-Tulipifera, Nyssa-Aquatica, Oxygen, *Permeability, Plantanus-Occidentalis, Sweet-Gum, Sycamore, *Trees, Tulip Tree, Tupelo, *Wet habitats.

The permeability of the cambirum to gas exchange varies significantly among tree species. The amount of tension required to pull air across the cambium of water tupelo (Nyssa aquatica) and green ash (Fraxinus pennsylvanica) is sufficiently low to permit free gas exchange with the atmosphere, whereas air movement is restricted across the cambia of sweetgum (Liquidambar styraciflua), yellow poplar (Liriodendron tulipifera) and sycamore (Platanus occidentalis). Water tupelo and green ash stems possess prominent intercellular spaces among the cambial ray initials forming an open interconnecting aeration system between the xylem and phloem rays on either side. Similar openings in the cambirum are absent or less than 1 micro in size in the other species examined. In mesophytic trees the transpiration stream undoubtedly plays a vital role in supplying O to, and removing CO2 from the actively dividing and differentiating cells on the xylem side of the relatively impervious cambium. Conversely, in hydrophytes, where air is often

limiting to the roots and water is plentiful, the cambium is increasingly more permeable to air.--Copyright 1973, Biological Abstracts, Inc.
W74-01998

THE BIOLOGY OF THE SOLDIER FISH, GYMNAPISTES MARMORATUS (PISCES:SCORPAENIDAE),
James Cook Univ. of North Queensland, Townsville (Australia). School of Biological Science.
C. J. Grant.
Aust J Mar Freshwater Res, Vol 23, No 2, p 151-163, 1972, Illus.
Identifiers: Age, *Australia (Tasmania), Bertalanffy, Biology, Fish foods, Growth, Gymnapistes-marmoratus, Pisces, Reproduction, *Scorpaenidae, *Soldier fish.

Various aspects of the biology of the scorpaenid G. marmoratus were studied during 1971 in the D'Entrecasteaux Channel, southern Tasmania. The species ranges from Darwin counterclockwise around the Australian coast to Sydney, but appears not to inhabit Queensland waters. In Tasmania the species commonly occurs at depths of 20 m or less, over sand or mud bottom with a light Zostera covering. During the day the fish lie motionless and are excellently camouflaged, possessing disruptive yellow and brown marbled markings; most of their activity occurs at night. Fish species associated with G. marmoratus are those typical of the bottom habitat of estuarine communities. Age determination by interpretation of annuli in burned otoliths was simple and accurate, and the population studied comprised individuals up to 14 yr of age. Growth was adequately described by the von Bertalanffy equation of organic growth, being of the decaying exponential type which defined the growth of G. marmoratus as: Lt ± 21.4 (1-exp (0.1168 (t + 2.3))). Reproduction is initiated at approximately 2 yr of age and spawning occurred in Aug.-Sept. Fecundity may be described related to length by the expression F ± 0.08L4.08. Stomach analysis indicated that shrimps and crabs made up a large portion of the diet of smaller fish, while the larger fish consumed other fish species as well.--Copyright 1973, Biological Abstracts, Inc.
W74-02000

SOME CHARACTERISTICS OF SOIL AND PERENNIAL VEGETATION IN NORTHERN MOJAVE DESERT AREAS OF THE NEVADA TEST SITE,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 05B.
W74-02024

SIMPLIFIED APPARATUS FOR DETERMINING LEAF WATER POTENTIALS IN PINE NEEDLES,
New Zealand Forest Service, Rotorua.
H. H. Gifford.
NZJ For Sci. Vol 2, yno 2, p 284-286. 1972. Illus.
Identifiers: Apparatus, *Leaf water potential, *New Zealand (Rotorua), *Pine needles.

For work on pine trees at the Forest Research Institute, Rotorua, New Zealand, a small pressure chamber was designed, and the chamber cap which holds the plant material was modified to permit easy operation and fast working. By using standard high pressure parts for constructing the chamber, its cost was lowered without reducing safety.--Copyright 1973, Biological Abstracts, Inc.
W74-02075

DIGENETIC TREMATODES OF FISH FROM VOLTA RIVER DRAINAGE SYSTEM IN GHANA PRIOR TO CONSTRUCTION OF VOLTA DAM AT AKOSOMBO IN MAY 1964,
State Univ. of New York, Binghamton. Dept. of Biology.
J. Fischthal, and J. D. Thomas.
J Helminthol. Vol 46, No 1, p 91-106. 1972, Illus.
Identifiers: Akosombo, Allocreadium-Ghanensis, Construction, Dam, *Drainage, Eumasenia-Proteropora, Fish, *Ghana (Volta River), Rivers, Species, *Trematodes (Digenetic).

The following trematodes were collected from fish from the Volta River drainage system, Ghana: Lobatostoma sp., Nephrocephalus bagri-incapsulatus, Phyllodistomum symmetrorchis, Opisthorchis piscicola, Allocreadium ghanensis from the rectum of Synodontis sp., Eumasenia ghanensis, E. proteropora (Thomas, 1958), Siphodera ghanensis, Sterrhurus musculus, Tubolovesicula lindbergi, Brevicaecum niloticum and Sandonia sudanensis.--Copyright 1973, Biological Abstracts, Inc.
W74-02077

INFLUENCE OF ENVIRONMENT AND LEAF EXCISION ON GAS EXCHANGE OF OAT LEAVES,
Guelph Univ. (Ontario). Dept. of Crop Science.
J. G. Criswell, and R. M. Shibles.
Iowa State J Res. Vol 47, No 2, p 129-139. 1972, Illus.
Identifiers: Avena-Sativa, Environment, *Gas exchange, *Leaf excision, Light, *Oat leaves, Photosynthesis, Temperature, Relative humidity.

Effects of light, temperature, relative humidity, and leaf excision on gaseous exchange processes of oat (Avena sativa L.) leaves were tested. Maximum net photosynthetic rates of attached oat leaves were achieved at about 27 degrees C leaf temperature and 200 w m-2 irradiance; net photosynthesis was insensitive to relative humidity over a wide range. Even under moderately high humidity, net photosynthesis of detached leaves began to decline as early as 20 min after excision. This is about the time required, after insertion into the leaf chamber, for induction to maximal net gas exchange of attached leaves.--Copyright 1973, Biological Abstracts, Inc.
W74-02084

ARCEUTHOBIUM PUSILLUM: MOISTURE REQUIREMENTS FOR GERMINATION AND RADICLE GROWTH,
Maritimes Forest Research Center, Fredericton (New Brunswick).
J. M. Bonga.
Can J Bot. Vol 50, No 11, p 2143-2147. 1972, Illus.
Identifiers: *Arceuthobium-Pusillum, *Germination, Humidity, Moisture requirements, *Radicle growth, *Spruce, Seeds, Parasites.

Seeds of A. pusillum (causative agent of witches' broom of spruce) were exposed to water, various relative humidities, and water followed weekly by various periods of dryness. With water, the seeds germinated more rapidly and produced longer radicles than with water in vapor form at any of the relative humidities used. At relative humidities of 90-100%, most of the seeds eventually germinated but the radicles remained short. Below 90% relative humidity, only a few seeds germinated. Some seeds germinated and produced radicles if exposed to weekly dry periods of up to 4 days. The distribution of the parasite is affected directly by water in liquid form and indirectly by water in vapor form.--Copyright 1973, Biological Abstracts, Inc.
W74-02088

EFFECT OF WATER DEPTH ON THE INFECTION OF BIOMPHALARIA GLABRATA BY MIRACIDIA OF ST. LUCIAN SCHISTOSOMA MANSONI UNDER LABORATORY AND FIELD CONDITIONS,
For primary bibliographic entry see Field 05C.
W74-02097

SEASONAL CHANGES IN SODIUM AND CHLORIDE CONCENTRATION OF SALTBUSH (ATRIPLEX SPP.) LEAVES AS RELATED TO SOIL AND PLANT WATER POTENTIAL,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Riverina Lab.
M. L. Sharma, J. Tunny, and D. J. Tongway.
Aust J Agric Res. Vol 23, No 6, p 1007-1019. 1972. Illus.
Identifiers: Atriplex-Nummullaria, Atriplex-Spp, Atriplex-Vasicaria, *Chloride concentration, Rain, *Saltbush leaves, Seasonal, *Sodium, Soils, Summer, *Salinity.

Na and chloride concentrations in mature leaves of 2 Atriplex species, A. nummularia and A. vesicaria, growing on 2 clay soils were monitored during June 1969-June 1970. The corresponding soil water content (W), osmotic potential (pi) and matrix potential (tau) of soil water, and relative leaf water content (w) were also evaluated. Both the Na and chloride concentrations in leaves increased progressively with the corresponding decrease in W in Sept.-Dec., reaching about twice their original values. From Dec. on, Na and chloride remained relatively stable until April when they started to decline progressively with a steady increase in W. Intermittent rains during summer changed W for short periods, but the leaf salinity remained unchanged. Irrespective of soil, A. nummularia leaves contained more Na than A. vesicaria, while the reverse was true for chloride. Invariably leaf salinity was strongly correlated with w, tau, and pi, but the correlation with w was significant only for A. vesicaria. Empirical equations fitted to indicate the relation of Na and chloride to each of the variables and also to multiple regressions of (pi, tau) and (W, w) are given. Various factors which might be responsible for inducing seasonal variability in the leaf salinity are discussed. It appears that the higher salinity build-up in Atriplex during summer is not only due to increased electrolyte concentration in the growing medium and to high transpiration rates, but is also associated with drought tolerance by these plants.--Copyright 1973, Biological Abstracts, Inc.
W74-02105

OBSERVATIONS ON SAMPLING PRE-IMAGINAL POPULATIONS OF BLACKFLIES (DIPT., SIMULIIDAE) IN WEST CAMEROON,
For primary bibliographic entry see Field 07B.
W74-02108

THE ENERGETICS OF FEEDING, METABOLISM AND GROWTH OF PERCH (PERCA FLUVIATILIS L.),
D. J. Solomon, and A. E. Brafield.
J Anim Ecol. Vol 41, No 3, p 699-718. 1972. Illus.
Identifiers: *Feeding, *Growth, *Metabolism, Perca-Fluviatilis, *Perch, Energy budget.

The energy relationships of feeding, metabolism and growth of a carnivorous freshwater fish, Perca fluviatilis, fed on Gammarus pulex is studied. Energy budgets for 28-day periods are presented for fish of different sizes and feeding regimes. Generally the agreement between energy measured as ingoing and outgoing was good; where the balance was not good, the only possible explanation appears to be a change in the calorific value of the fish. Maintenance coefficients (energy required/g of fish/yr to maintain weight) fall within the range for other freshwater fish, and vary indirectly with the size of fish. The results are compared with those of other workers and with Winberg's (1956) predictions of metabolism. It is suggested that a more accurate estimate of metabolic rate would take account of feeding. The results of these experiments, the first in which all categories of energy flow were continuously measured in a growing fish, indicate that the majority of the as-

sumptions often made in energy studies are valid.--Copyright 1973, Biological Abstracts, Inc.
W74-02109

PAST AND CURRENT RESEARCH ON DISEASES OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.),
Florida Univ., Gainesville. Dept. of Plant Pathology.
H. F. Hayslip, and F. W. Zettler.
Hyacinth Control Journal, Vol 11, p 38-40, June 1973. OWRR B-011-FLA (12). 14-31-0001-3268.

Descriptors: *Plant pathogens, *Aquatic plants, *Biocontrol, *Florida, *Aquatic weeds.
Identifiers: *Eurasian watermilfoil.

Eurasian watermilfoil (Myriophyllum spicatum L.) was first observed in Florida in the mid 1960's. Since then it has become a severe problem in several areas of Florida including the Crystal River, Deer Point Lake, and Lake Seminole. Other areas of the United States such as Currituck Sound in North Carolina and the Tennessee Valley have similar problems with Eurasian watermilfoil. In recent years, biocontrol agents have been given increasing consideration as a means of controlling this weed. Phytophagous insects have been reported on Eurasian watermilfoil but none are currently being used as biocontrols. Other phytophagous animals such as fish, manatees, and snails have also been investigated but their value as biocontrols of Eurasian watermilfoil remains to be determined. Unfortunately, relatively little attention has been given to pathogens of this plant despite the obvious potentials of viruses, fungi, bacteria, and nematodes as biocontrols. A search for phytopathogens as biocontrols of waterweeds, including Eurasian watermilfoil, was initiated at the University of Florida in 1970. Although several diseases of aquatic plants have been reported by workers on this project none has been reported on Eurasian watermilfoil. The progress of this program with respect to Eurasian watermilfoil is reported. (Morgan-Florida)
W74-02112

2J. Erosion and Sedimentation

EFFECT OF BENTHIC SEDIMENTS ON THE OXYGEN CYCLE IN PONDS, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 02H.
W74-01660

APPLICATION OF ERTS-1 MULTISPECTRAL IMAGERY TO MONITORING THE PRESENT EPISODE OF ACCELERATED EROSION IN SOUTHERN ARIZONA,
Geological Survey, Denver, Colo.
R. B. Morrison, and M. E. Cooley.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics Space and Admin Rept NASA SP-327, p 283-290, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Aerial photography, *Accelerated erosion, *Arizona, Mapping, Soil erosion, Surveys, Grasslands, Arid lands, Sheet erosion, Geomorphology, Terrain analysis, Gully erosion, Data collections.
Identifiers: ERTS.

An episode of accelerated arroy-cutting and sheet erosion commenced about 1890 in southern Arizona, following several thousand years of generally sluggish erosion. For a 17,000-square-mile study area, ERTS-1 images, supplemented by ultrahigh-altitide (U-2 and RB-57) airphotos, are proving effective for producing the first comprehensive maps showing the distribution and seriousness of the post-1890 erosion features, for monitoring new erosion changes, and for assessing the effectiveness of ameliorative measures. Such data are essential for understanind and controlling the accelerated erosion, a key environmental problem in this region. (See also W74-01663) (Knapp-USGS)
W74-01696

WAVE-INDUCED BOTTOM CURRENTS ON THE OUTER SHELF,
National Inst. of Oceanography, Wormley (England).
J. A. Ewing.
Marine Geology, Vol 15, No 2, p M31-M35, September 1973. 2 fig, 10 ref.

Descriptors: *Curents (water), *Waves (water), *Continental shelf, *Sediment transport, Storms, Ocean waves, Bottom sediments.

Estimates of the wave-induced oscillatory bottom currents available to move sediment on the continental shelf were made using the Pierson-Moskowitz wave spectrum; the oscillations are substantially stronger than had previously been thought. Near a shelf edge with canyons the wave-induced currents can be locally enhanced by wave refraction as much as about four times. Local sediment-transport rates will be greater and will occur more frequently than had previously been supposed. (Knapp-USGS)
W74-01719

PROVENANCES AND DISPERSAL PATTERNS OF TURBIDITE SAND IN ESCANABA TROUGH, NORTHEASTERN PACIFIC OCEAN,
Scripps Institution of Oceanography, La Jolla, Calif.
T. L. Vallier, P. J. Harold, and W. A. Girdley.
Marine Geology, Vol 15, No 2, p 67-87, September 1973. 7 fig, 5 tab, 43 ref.

Descriptors: *Bottom sediments, *Pacific Ocean, *Turbidity currents, *Sediment transport, Provenance, Sedimentation, Sedimentology, Sands.

Escanaba Trough, the median valley of Gorda Ridge in the northeastern Pacific, is partly filled with terrigenous sediment which was eroded mostly from rocks in the Klamath and Columbia River drainage basins and transported across the sea floor to the trough by turbidity currents. Basal or lower cores contain sand derived from the south-central metamorphic belt of the Klamath Mountains, whereas the upper cores have samd derived from the Columbia River drainage basin. Columbia River sediment reached Escanaba Trough either after a barier at Blanco Valley had been destroyed by tectonic movement or after a gradient, sufficient to maintain turbidity current momentum, had developed between the Astoria Fan apex and the trough. Sediment in Escanaba Trough is young and most probably was deposited when sea level was lower than at present, perhaps during the Wisconsin Glacial Age. (Knapp-USGS)
W74-01720

DYNAMICS AND THERMAL REGIMEN OF RIVER FLOWS (DINAMIKA I TERMIKA RECHNYKH POTOKOV).
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 02E.
W74-01722

SUSPENDED-SEDIMENT BALANCE IN THE RYBINSK RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V RYBINSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 05B.
W74-01729

SUSPENDED-SEDIMENT BALANCE IN THE UGLICH RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V UGLICHSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 05B.
W74-01730

SEDIMENT-RETAINING CAPACITY OF THE UGLICH RESERVOIR (O NANOSOUDERZHIVAYUSHCHEY SPOSOBNOSTI UGLICHSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
V. P. Kurdin, and N. A. Ziminova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 221-225, Leningrad, 1972. 2 fig, 3 tab, 3 ref.

Descriptors: *Reservoirs, *Sedimentation, *Reservoir silting, *Deposition (Sediments), *Bottom sediments, Depth, Cross-sections, Curves.
Identifiers: *USSR (Uglich Reservoir).

The sediment-retaining capacity of the Uglich Reservoir for a 29-year period (1940-68) was calculated by methods of cross-sections and curves. The sediment-retaining capacity of the reservoir was 8,030,000 metric tons or 0.0123 cu km of deposited suspended sediment. A large portion of the sediment (3,202,000 metric tons) was deposited at depths greater than 9 m. The rate of silting of the reservoir increases from its upper reaches toward the gaging station of the Uglich works, reaching maximum values before the dam. Agreement in the results of computation of bottom-sediment deposition by these methods makes it possible to use them to calculate silt accumulations in reservoirs similar to the Uglich. (See also W74-01723) (Josefson-USGS)
W74-01731

PHOSPHORUS: ANALYSIS OF WATER, BIOMASS, AND SEDIMENT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 05C.
W74-01800

CHANGES IN C, N, P, AND S IN THE LAST 140 YEARS IN THREE CORES FROM LAKES ONTARIO, ERIE, AND HURON,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01805

EFFECTS OF SEDIMENT DIAGENESIS AND REGENERATION OF PHOSPHORUS WITH SPECIAL REFERENCE TO LAKES ERIE AND ONTARIO,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01806

COARSE COMPONENTS IN SURFACE SEDIMENTS OF THE PANAMA BASIN, EASTERN EQUATORIAL PACIFIC,
Oregon State Univ., Corvallis. School of Oceanography.
R. O. Kowsmann.
Journal fo Geology, Vol 81, No 4, p 473-494, July 1973. 14 fig, 1 tab, 47 ref. ONR Contract N00014-67-A-0369-0007.

Descriptors: *Sedimentation, *Pacific Ocean, *Calcium carbonate, *Silica, *Aquatic microorganisms, Plankton, Provenance, Sediment distribution, Mineralogy.
Identifiers: *Panama Basin, *Biogenic sediments.

The abundance and distribution of biogenic, terrigenous, and volcanic particles in the Panama Basin are markedly dependent on bottom topography and dissolution of calcite in the deeper parts of the basin. Of the coarse fraction, foraminiferal tests and acidic volcanic glass shards are concentrated on the Cocos and Carnegie Ridges as lag deposits. Foraminiferal fragments found on these ridge flanks and on the Malpelo Ridge are modified by the winnowing of bottom currents and by dissolution of calcite with increasing depth. The hydrodynamically light radiolarian skeletons are concentrated by bottom currents in the basin adjacent to the ridges. The foraminiferal calcite compensation depth in the basin is 3,400 micro. This relatively shallow depth is probably a consequence of the high biologic productivity in the cold, nutrient-rich surface waters over the basin. The pattern of productivity, however, is not reflected in the pattern of biogenic sediments. Acidic volcanic glass appears to have been carried into the basin from Costa Rica, Colombia, and Ecuador by easterly winds at altitudes of 1,500-6,000 micro. Basaltic shards from the Galapagos Island have been dispersed only over short distances to the west. Terrigenous sand-sized material is found on the edge of the continental shelf, where associated glauconite points to a relict origin, and along the northern Cocos Ridge, where contour currents may act as the dispersal mechanism. (Knapp-USGS)
W74-01877

BIOGENIC SEDIMENTS OF THE PANAMA BASIN,
Oregon State Univ., Corvallis. School of Oceanography.
T. C. Moore, Jr., G. R. Heath, and R. O. Kowsmann.
Journal of Geology, Vol 81, No 4, p 458-472, July 1973. 10 fig, 28 ref.

Descriptors: *Sedimentation, *Pacific Ocean, *Calcium carbonate, *Silica, *Aquatic microorganisms, Plankton, Provenance, Sediment distribution, Mineralogy.
Identifiers: *Panama Basin, *Biogenic sediments.

The Panama Basin is a miniature ocean basin in which the effect of variable rates of supply, dilution, dissolution, and lateral transport of biogenous sediments can be studied in detail. The rate of input inferred from rates of biologic productivity in surface waters does not resemble the distribution of either carbonate (foraminifera and calcareous nannofossils) or opal (diatoms and radiolaria) in sediments at the sea floor. The distribution of carbonate is primarily controlled by dissolution; at any depth, the rate is highest adjacent to the continent and decreases offshore in the more pelagic areas. The rate of dissolution increases rapidly with depth at about 1,500 micros. Winnowing and lateral transport from ridges into the basin is the second most important factor controlling the distribution of carbonate and the dominant factor governing the distribution of opal. In pelagic sediments of the western basin, about half the carbonate fraction appears to be derived from the surrounding ridges. Dilution of terrigenous material is important only in the eastern Panama Basin, where the concentration of opal is significantly reduced by fine-grained debris derived from Central America. (Knapp-USGS)
W74-01878

TEXTURE AND DISPERSAL OF SEDIMENTS IN THE PANAMA BASIN,
Oregon State Univ., Corvallis. School of Oceanography.
T. H. Van Andel.
Journal of Geology, Vol 81, No 4, p 434-457, July 1973. 18 fig, 2 tab, 18 ref.

Descriptors: *Sediment distribution, *Sediment transport, *Sediment sorting, *Pacific Ocean, Ocean currents, Provenance, Sampling, Particle size.
Identifiers: *Panama Basin.

The Panama Basin in the eastern equatorial Pacific is bordered by the continental margins of Central and South America and by the Cocos and Carnegie Ridges. A series of banks divides it into an eastern and a western basin. The distribution patterns of the sediments are the product of complex interactions between biological productivity, dissolution of calcite at depth, influx of continental debris, and dispersal and reworking of sediments by deep currents. The coarsest grain-size modes in the sand and soarse-silt range are concentrated on banks and ridges by winnowing, while the finer material is deposited on ridge slopes and in the western basin. Approximately one-half of the sediment in the deep western basin is the product of reworking. In contrast, the finest silt and clay modes have been dispersed by near-bottom currents and show transport of continental and fine biogenous material from the eastern to the western basin through gaps in the dividing ranges. (Knapp-USGS)
W74-01879

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01885

CONCEPTUAL MODELS: 2. FLUVIAL-ALLUVIAL, GLACIAL, LACUSTRINE, DESERT, AND SHOREZONE (BAR-BEACH-DUNE-CHENIER) SEDIMENTARY ENVIRONMENTS,
Laurentian Univ., Sudbury (Ontario). Dept. of Geology.
K. H. Wolf.
Sedimentary Geology, Vol 9 , No 4, p 261-181, August 1973. 5 fig, 19 ref.

Descriptors: *Sedimentology, *Alluvial channels, *Lakes, *Deserts, *Beaches, *Shores, Sedimentation, Sediment transport, Coasts.

Conceptual models of five sedimentary environments are offered, of fluvial-alluvial, glacial, lacustrine, desert, and shorezone (bar-beach-dune-chenier) milieus. In the fluvial-alluvial model it is impossible to make a clear distinction between a source area, on the one hand, and a depositional area, on the other, because both erosion and accumulation of sediments can occur anywhere in the system. Glacial deposits range from ice-contact to glacio-fluvial, glacio-lacustrine, glacio-aeolian, and various types of glacio-marine deposits. All of these are transitional with each other and can be very complex. There is no simple lacustrine environment because the complex of sediments accumulate in a lacustrine basin with variable physical, chemical, biological, and geomorphologic conditions. The desert model resembles the lacustrine one as in both instances the sedimentary milieus can be the result of multiple geomorphologic combinations so that it is necessary to give a classification of the types of environments in addition to the various sedimentary parts that may be present. The desert model differs from most other models (except possibly the one on continental glaciation) in that it is directly dependent on global meteoritic factors in combination with global geographic factors. Several separate, local sedimentary environments have been combined in the shore zone model since the origin of bars, beaches, dunes, and chenier plains are genetically related. (Knapp-USGS)
W74-01940

SEVENTEEN-YEAR SEDIMENT PRODUCTION FROM A SEMIARID WATERSHED IN THE SOUTHWEST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04D.
W74-01948

DISTRIBUTION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN HUENEME, REDONDO, NEWPORT, AND LA JOLLA SUBMARINE CANYONS, CALIFORNIA,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02L.
W74-01954

SUSPENDED SEDIMENT TRANSPORT ON THE NORTHERN OREGON CONTINENTAL SHELF,
Naval Academy, Annapolis, Md. Dept. of Environmental Sciences.
J. C. Harlett, and L. D. Kulm.
Geological Society of America Bulletin, Vol 84, No 12, p 3815-3826, December 1973. 11 fig, 24 ref. USGS 14-08-0001-11941, 12187, 12830 NOAA Sea Grant 2-35187.

Descriptors: *Sediment transport, *Suspended load, *Continental shelf, *Oregon, Currents (Water), Tides, Thermocline, Thermal stratification, Waves (Water), Littoral drift, Turbidity.

Bottom currents on the northern Oregon continental shelf have widely varying speeds with means near 10 cm per sec. Current direction is more constant but often is rotary. Generation may be due to internal and surface tides. Suspended material concentrates principally at the seasonal thermocline, at the permanent pycnocline, and at the bottom. Thickness and intensity of the bottom layer vary with both current strength and the amount of fine material in the surface sediment, whereas the intensity of the midwater layer appears to be related to the distance from the sediment source. The midwater layer also increases in vertical extent away from the shore. Seaward transport at the upper two surfaces provides a mechanism by which terrigenous sediment and biogenous material bypasses the outer continental shelf. (Knapp-USGS)
W74-01956

SCOURING OF BURIED PLEISTOCENE BARRIER COMPLEXES AS A SOURCE OF CHANNEL SAND IN TIDAL CREEKS, NORTH ISLAND QUADRANGLE, SOUTH CAROLINA,
South Carolina Univ., Columbia. Dept. of Geology.
E. Andrews, D. G. Stephens, and D. J. Colquhoun.
Geological Society of America Bulletin, Vol 84, No 11, p 3659-3662, November 1973. 4 fig, 8 ref.

Descriptors: *Sands, *Provenance, *Erosion, *Alluvium, *Tidal streams, *South Carolina, Alluvial channels, Deltas, Coastal marshes, Pleistocene epoch.

During the Pleistocene Epoch, a marine regression resulted in the deposition of a series of beach ridges on the continental shelf of South Carolina. With a rise in sea level, the ridges were inundated behind a landward-advancing Holocene barrier, and infilled by barrier and back-barrier environments. Subsequently, tidal creeks within the back-barrier environments have scoured the underlying Pleistocene deposits and incorporated these deposits with the Holocene sediment to form large sand bodies in an abb-tide direction at some meander bends. (Knapp-USGS)
W74-01960

OBSERVATIONS OF BEACH CUSPS AT MONO LAKE, CALIFORNIA,
Oregon State Univ., Corvallis. School of Oceanography.
P. D. Komar.
Geological Society of America Bulletin, Vol 84, No 11, p 3593-3600, November 1973. 4 fig, 1 tab, 21 ref. NSF Grant GA-36817.

Descriptors: Beaches, *Sedimentary structures, Sand waves, Erosion, Sediment transport, Sedimentation, Lakes, *California, Waves (Water).
Identifiers: *Mono Lake (Calif), *Beach cusps.

Beach cusps (uniformly spaced mounds or ridges of sediments that trend at right angles to the shoreline) are observed at Mono Lake, California. The cusps have spacings ranging from 11 to 59 cm, making them some of the smallest examples of natural beach cusps. They possess all the features observed in the much larger cusps found on ocean beaches: the same basic morphology, similar sediment sorting, and the same water circulation about the cusps. They form best when the lake is essentially smooth, when only surging, nonbreaking waves arrive at the shoreline. Edge waves, trapped by refraction to the nearshore, probably account for the cust formation and rhythmic spacing. (Knapp-USGS)
W74-01961

FACTORS GOVERNING CHANGES IN CHANNEL PROCESSES (FAKTORY, OPREDELYAYUSHCHIYE KHOD RUSLOVYKH PROTSESSOV),
All-Union Designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR).
I. A. Kuz'min.
Vodnyye Resursy, No 3, p 173-189, 1972. 4 ref.

Descriptors: *Channels, *Channel flow, *Channel morphology, *Channel erosion, *Deposition (Sediments), Sediment transport, Banks, Beds, Meanders, Flood plains, Discharge (Water), Geomorphology, Hydrology.
Identifiers: USSR, Tectonics.

The channel as the surface of contact between river flow and the streambed, and the relation of channel processes to adjacent geomorphological and hydrological processes are analyzed. Generally, channel deformations are the result of tectonic processes and the transport of sediment from higher to lower levels. Depending on direction of the channel process, deformations are classified as (1) deformations in regions of predominant erosion; (2) alternating, weakly expressed deformations in regions of sediment transport; and (3) deformations in regions of predominant aggradation. Deformations of the entire channel are expressed in local deformations, which have their own specific characteristics. Depending on channel structure, local channel processes are classified as (1) channel deformations in cohesive materials; (2) channel deformations in noncohesive materials; and (3) channel deformations in materials of complex structure. Local deformations are cyclic in character and are influenced by opposing tendencies. These cyclic local processes are classified as (1) meandering; (2) periodic widening; and (3) wandering. Depending on the character and scale of projects undertaken, the activities of man can produce channel deformations. (Josefson-USGS)
W74-01964

MEASUREMENT OF THE COMPLEX DYNAMIC RIGIDITY OF RECENT MARINE SEDIMENTS,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02L.
W74-02146

2K. Chemical Processes

HIGH SENSITIVITY LASER ABSORPTION SPECTROSCOPY OF LABORATORY AQUEOUS SOLUTIONS AND OF NATURAL MISSOURI WATERS. A FEASIBILITY STUDY,
Missouri Univ., Kansas City. Dept. of Physics.
M. R. Querry, W. E. Holland, R. C. Waring, F. M. Hale, and M. D. Hermann.
Available from the National Technical Information Service as PB-225 431/6, $3.75 in paper copy, $1.45 in microfiche. Missouri Water Resources Research Center Completion Report, August 1973. 77 p, 8 fig, 8 ref, 3 append. OWRR A-058-MO (2). 14-31-0001-3825.

Descriptors: *Chlorophyll, *Spectroscopy, Absorption, Iron, Sulfates, *Missouri, Aqueous solutions, Non-destructive tests, Measurement.
Identifiers: *Laser enhanced adsorption, Spectroscopy.

Investigations have definitely shown that the quantity of both chlorophyll types a and b can be nondestructively measured in solution by use of laser enhanced absorption spectroscopy (LEAS) at 1/100 the concentration easily detectable by use of ordinary spectrophotometric methods; this is a 100 times increase in sensitivity. It is estimated that the ultimate sensitivity for the LEAS technique is 10,000 times greater than that for ordinary spectrophotometric methods.
W74-01658

INFRARED REFLECTANCE MEASUREMENTS OF MISSOURI WATERS FOR WATER QUALITY APPLICATIONS,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 05A.
W74-01659

RATIO MAPS OF IRON ORE DEPOSITS, ATLANTIC CITY DISTRICT, WYOMING,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07C.
W74-01705

USE OF ERTS-1 IMAGES IN THE SEARCH FOR PORPHYRY COPPER DEPOSITS IN PAKISTANI BALUCHISTAN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01706

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 04B.
W74-01721

ORGANIC MATTER AND ELEMENTS IN THE HYDROLOGIC REGIMEN OF VOLGA RESERVOIRS (ORGANICHESKOYE VESHCHESTVO I ELEMENTY GIDROLOGICHESKOGO REZHIMA VOLZHSKIKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01723

ORGANIC MATTER IN WATER OF THE VOLGA RIVER AND ITS RESERVOIRS IN JUNE 1966 AND JULY 1969 (ORGANICHESKOYE VESHCHESTOVO V VODE VOLGI I YEYE VODOKHRANILISHCH V IYUNE 1966 G. I IYULE 1969 G.),
Akademiya Nauk SSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01724

ORGANIC MATTER IN WATER OF LAKE ONEGA AND SOME WATER BODIES OF THE VOLGA-BALTIC WATERWAY IN THE SUMMER OF 1968 (ORGANICHESKOYE VESHCHESTVO V VODE ONEZHSKOGO OZERA I NEKOTORYKH VODOYEMOV VOLGO-BALTIYSKOGO VODNOGE PUTI LETOM 1968 G.),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01725

THE INFLUENCE OF A CHEMICAL PLANT SEWAGE SEDIMENTATION CATCHPIT ON GROUNDWATERS OF THE UPPER VISTULA FLOODPLAIN,
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
For primary bibliographic entry see Field 05B.
W74-01754

SPECTROPHOTOMETRIC DETERMINATION OF SOIL WATER CONTENT,
For primary bibliographic entry see Field 02G.
W74-01770

CHEMISTRY AND APPLICATION OF ORGANOPHOSPHORUS COMPOUNDS, PROCEEDINGS OF THIRD CONFERENCE.
For primary bibliographic entry see Field 05B.
W74-01787

CONJUGATION IN SYSTEMS WITH TETRAHEDRAL PHOSPHORUS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
For primary bibliographic entry see Field 05B.
W74-01788

INVESTIGATIONS OF WATER SAMPLES FROM BROOKS, STREAMS, AND LAKES IN AREAS WITH DIFFERENT PARENT MATERIAL,
Norges Landbrukshoegskole, Vollebekk.
A. Oien.
Meld Nor Landbrukshogsk, Vol 50, No 19, p 1-9, 1971, Illus, English summary.
Identifiers: Brooks, Lakes, *Norway (Nordmarka), Streams, Water samples, *Sampling, *Electrolytes, *Minerals.

The electrolytes in water samples from brooks, streams, and lakes in Nordmarka north of Oslo, and from a lake, Arungen in As (Norway) were investigated. The areas in Nordmarka are covered with autochthonous morainic material, poor in clay. The amounts of dissolved minerals due to igneous Permian rocks, granite, syenite, and monzonite, were small, while water samples from a Cambro-Siourian area contained relatively great amounts of dissolved minerals. The concentrations of electrolytes were proportional to the electrical conductance, and pH also increased with increasing conductance. The variation in the Ca/Mg proportion was relatively small, except in water samples from the Cambro-Silurian area, where it was very high. The content of K was low in comparison with that of Na. The content of electrolytes of the water samples was approximately the same as that of lakes in areas with corresponding parent material. Water samples high in Fe and Mn also contained unusually high amounts of or-

ganic material. The phosphate content was less than 0.03 mg P/l. Water from an eutrophic lake, Arungen, contained considerably more, 0.11 mg/l. The high content of alkali metals and phosphate in Arungen is also an indication of pollution. Sampling was usually repeated in the different localities. The variation in the ionic concentrations was relatively small. This is indicative of an equilibrium between the mineral particles and the ions in the water. The differences in the ionic concentration in the samples from brooks, streams, and lakes in the area surrounding Gjerdingen and Gjerdingselva, are relatively small.--Copyright 1973, Biological Abstracts, Inc.
W74-01817

BIOGENIC SEDIMENTS OF THE PANAMA BASIN,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 02J.
W74-01878

WATER QUALITY IN THE CONSERVATION AREAS OF THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT, 1970--72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05B.
W74-01881

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01885

AVAILABILITY OF PHOSPHORUS AND NITROGEN IN ACID SOIL IN PRESENCE OF CALCIUM SALTS,
Allahabad Univ. (India). Dept. of Chemistry.
For primary bibliographic entry see Field 02G.
W74-01896

THE SUBSIDENCE OF THE SURFACE BETWEEN MOGOTES IN PURETO RICO EAST OF ARECIBO,
Technische Universitaet, Hanover (West Germany). Geographisches Institut.
For primary bibliographic entry see Field 02F.
W74-01912

WATER RESOURCES OF THE RUSTON AREA, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 04B.
W74-01921

MEASUREMENTS PROGRAM FOR OIL-SLICK CHARACTERISTICS--FINAL REPORT,
Michigan Univ., Ann Arbor. Willow Run Labs.
For primary bibliographic entry see Field 05B.
W74-01941

INVESTIGATION OF RELIEF WELLS, MISSISSIPPI RIVER LEVEES, ALTON TO GALE, ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 04B.
W74-01942

MATHEMATICAL SIMULATION OF SALINITY IN THE SACRAMENTO ROVER SYSTEM,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 05B.
W74-01944

ACHIEVEMENTS AND IMMEDIATE TASKS OF HYDROCHEMISTRY ON THE FIFTIETH ANNIVERSARY OF THE FOUNDING OF THE USSR (DOSTIZHENIYA GIDROKHIMII ZA 50 LET SUSHCHESTVOVANIYA SSSR I YEYE BLIZHAYSHIYE ZADACHI),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
O. A. Alekin.
Vodnyye Resursy, No 3, p 25-32, 1972.

Descriptors: *Water chemistry, *Water quality, Water quality control, Water pollution control, Self-purification, Water types.
Identifiers: *USSR.

Main stages in the development of hydrochemistry as a science, and successes attained in this field are discussed. Hydrochemistry is examined as a scientific discipline concerned with the chemical composition of all natural waters (hydrosphere) and not of surface waters alone. Of all types of natural waters, the least studied is the composition of atmospheric precipitation. A fundamental problem of hydrochemistry is that of studying environmental effects on water quality and of establishing quantitative relations. The role of hydrochemistry in water quality control is noted, and important tasks of hydrochemistry are outlined. (Josefson-USGS)
W74-01969

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02138

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
J. Rawson, H. L. Kunze, and H. J. Davidson.
Texas Water Development Board Report 177, September 1973. 102 p, 10 fig, 37 tab, 9 ref.

Descriptors: *Water quality, *Water analysis, *Chemical analysis, *Reservoirs, *Texas, Basic data collections, Lakes, Water chemistry, Sampling, Sites, Maps, Water temperature.

Periodically since 1961, the U.S. Geological Survey, in cooperation with State, Federal, and local agencies, has made comprehensive water-quality surveys of selected reservoirs in Texas. During the 1970 water year, the program was expanded to include periodic sampling of many other reservoirs in the State where surveys were not being made. The results of water-quality surveys of nine reservoirs and the results of chemical analyses of water samples collected periodically from 55 other reservoirs are presented. (Woodard-USGS)
W74-02139

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02141

2L. Estuaries

WAVE-INDUCED BOTTOM CURRENTS ON THE OUTER SHELF,
National Inst. of Oceanography, Wormley (England).
For primary bibliographic entry see Field 02J.
W74-01719

PROVENANCES AND DISPERSAL PATTERNS OF TURBIDITE SAND IN ESCANABA TROUGH, NORTHEASTERN PACIFIC OCEAN,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02J.
W74-01720

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.
For primary bibliographic entry see Field 05C.
W74-01732

SPARTINA ALTERNIFLORA (TALL) PRODUCTIVITY IN A POLLUTED NEW JERSEY ESTUARY,
Lehigh Univ., Bethlehem, Pa. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01738

TOXICITY OF TWENTY-THREE INSECTICIDES TO A TUBIFICID WORM BRANCHIURA SOWERBYI FROM THE MISSISSIPPI DELTA,
Mississippi State Univ., State College. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-01740

DISSOLVED POLLUTION PRODUCT GASES IN NATURAL WATERS,
Maine Univ., Walpole. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-01786

ECONOMICS OF MARINE RESOURCES DECISION MODEL,
California Univ., Santa Barbara. Marine Sciences Inst.
For primary bibliographic entry see Field 06A.
W74-01837

EVALUATION OF WATER PENETRATION PHOTOGRAPHY FOR BOTTOM SEDIMENT MAPPING IN LITTLE HARBOR, CATALINA ISLAND,
Geosource International Inc., Seal Beach, Calif. Geoscience Div.
For primary bibliographic entry see Field 07B.
W74-01949

DISTRIBUTION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN HUENEME, REDONDO, NEWPORT, AND LA JOLLA SUBMARINE CANYONS, CALIFORNIA,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
D. E. Drake, and D. S. Gorsline.
Geological Society of America Bulletin, Vol 84, No 12, p 3949-3968, December 1973. 12 fig, 1 tab, 44 ref. NSF Grant GA-22842.

Descriptors: *Submarine canyons, *Turbidity currents, Continental shelf, *California, Turbidity, Suspended load, Currents (Water), Density stratification, Sea water.

Studies of the distribution of suspended particulate matter in the waters over Hueneme, Redondo, Newport, and La Jolla submarine canyons off southern California were combined with analyses of recordings of canyon-floor currents to evaluate the influence of canyons on the seaward dispersal of fine, terrigenous sediment. Suspended sediment concentrations and composition over the mainland shelf in fall and winter are controlled principally by terrigenous-sediment supply. Consequently, particle concentrations at all levels generally increased toward the coast. The vertical distribution

of suspended particulate matter was influenced strongly by the density structure of the water column on the shelf and slope, and sharply bounded, midwater, turbidity maxima were well developed over the shelf where sediment supply is comparatively large. Nepheloid layers were present and ranged from a few meters to greater than 200 m in thickness with peak particle concentrations of 5 to 7 mg per liter over the inner shelf and within the steep-walled, headward portions of each canyon. The slow, net downcanyon water transport may be explained in part by the mechanism of turbid-layer flow. (Knapp-USGS)
W74-01954

ECOLOGY OF SALT MARSHES AND SAND DUNES,
D. S. Ranwell.
Chapman and Hall: London, England; Halsted Press, a division of John Wiley and Sons, Inc.: New York, N.Y., 1972. 258 p. Illus. Maps. Pr $14.50.
Identifiers: Books, Climate, *Ecology, Human influences, Resources, *Salt marshes, *Sand dunes, Soils, Wildlife.

The salt marsh and sand dune habitats and the ecological processes operating within them are compared. The book is divided into 4 major sections. The first part, general relationships, discusses climatic restraints, physiography and hydrology and mineral nutrient relations. Part 2, salt marshes, discusses tidal influence; sedimentation, drainage and soil physical development; species strategies; and structure and function of communities. Part 3, sand dunes, covers formation and differentiation of the habitat; sand, water relations and processes of soil formation; structure and function of dune communities; and structure and function of slack communities. The final section, human influences, covers management of salt marshes wildlife resources and management of sand dune wildlife resources. A comprehensive bibliography includes 400 references.--Copyright 1973, Biological Abstracts, Inc.
W74-01984

A NEW RECORD OF THE BOWFIN, AMIA CALVA LINNAEUS, IN THE UPPER CHESAPEAKE BAY,
Edgewood Arsenal, Md. Biomedical Lab.
J. G. Pearson, and F. P. Ward.
Chesapeake Sci. Vol 13, No 4, p 323-324. 1972. Illus.
Identifiers: Amia-calva, Bays, *Bowfin, *Chesapeake Bay, *Maryland (Gunpowder River), Estuaries.

Five adult bowfin, A. calva, were gill-netted in the Gunpowder River estuary of the upper Chesapeake Bay, in Jan., Feb. and March of 1972. These are the first records of the species in the area. Various counts and measurements of the specimens agreed with previous descriptions. The fish probably washed into tributaries of the Gunpowder River from stock ponds that overflowed following extremely heavy rains on 1 Aug. 1971. Approximately 600-700 adult bowfin apparently escaped. At least some of the fish were able to tolerate the estuarine conditions; however, only successful reproduction will determine whether or not the fish becomes established in the area.--Copyright 1973, Biological Abstracts, Inc.
W74-01986

ENERGY REQUIREMENTS AND FOOD SUPPLIES OF CTENOPHORES AND JELLYFISH IN THE PATUXENT RIVER ESTUARY,
Fisheries Research Board of Canada, St. John's. (Newfoundland). Biological Station.
R. J. Miller, and R. B. Williams.
Chesapeake Sci. Vol 13, No 4, p 328-331. 1972.
Identifiers: *Ctenophores, Energy, *Estuary, Food, *Jellyfish, *Maryland (Patuxent River), Phytoplankton, Rivers, Zooplankton.

Interpretation of published data for the Patuxent River, Maryland, indicates that for most of the year the total biomass of phytoplankton and zooplankton was inadequate to meet the minimum energy needs of ctenophores and jellyfish.--Copyright 1973, Biological Abstracts, Inc.
W74-01991

UREA AND OTHER NITROGENOUS NUTRIENTS IN LA JOLLA BAY DURING FEBRUARY, MARCH AND APRIL 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05B.
W74-01993

AQUATIC AND ATMOSPHERIC SIMULATION,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W74-02003

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W74-02012

STABLE MANGANESE AND MANGANESE-54 DISTRIBUTIONS IN THE PHYSICAL AND BIOLOGICAL COMPONENTS OF THE HUDSON RIVER ESTUARY,
New York Univ. Medical Center, N.Y.
For primary bibliographic entry see Field 05B.
W74-02048

ACCUMULATION OF SOLUBLE AND PARTICULATE RADIONUCLIDES BY ESTUARINE FISH,
National Marine Fisheries Service, Beaufort, N.C.
For primary bibliographic entry see Field 05B.
W74-02049

BIOLOGICAL AND CHEMICAL STUDY OF VIRGINIA'S ESTUARIES,
Virginia Electric and Power Co., Richmond.
For primary bibliographic entry see Field 05B.
W74-02052

THE MARSHES OF MISSISSIPPI,
Gulf Coast Research Lab., Ocean Springs, Miss.
L. N. Eleuterius.
Castanea. Vol 37, No 3, p 153-168, 1972, Illus.
Identifiers: Estuaries, *Marshes, *Mississippi, *Salinity gradient, *Vascular plants.

Mississippi marshes were sampled during 1968 and 1969 by line transect and list count quadrats and the composition of vascular plants throughout the salinity gradient was determined in 3 estuarine systems. Profile diagrams were prepared to illustrate lateral zonation of the plant communities. Marsh acreage, measured by planimeter from survey maps, was determined. Organic production of the vascular marsh plants in Mississippi was estimated. Present and projected man-made changes in the marshes are discussed. Some observations on composition and zonation of plant colonization on spoilbanks and landfills are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-02081

A TEN-YEAR STUDY OF MEROPLANKTON IN NORTH CAROLINA ESTUARIES: MYSID SHRIMPS,
National Marine Fisheries Service, Washington, D.C. Systematics Lab.
A. B. Williams.
Chesapeake Sci. Vol 13, No 4, p 254-262. 1972. Illus.
Identifiers: Bowmaniella-Dissimilis, Bowmaniella-Johnsoni, *Estuaries, Heteromysis-Formosa, Metamysidopsis-Mexicana, Mysidopsis-Bigelowi, Neomysis-Americana, *North Carolina, Plankton, Promysis-Atlantica, Year, *Meroplankton, *Mysid shrimps.

Seven species of mysid shrimps taken in semiquantitative, nocturnal, surface plankton samples showed variable levels of abundance and frequency of occurrence from stations near the sea to the head of estuaries in North Carolina. Bowmaniella dissimilis occurred mainly in samples from stations near the sea in every month of the year, and reached its greatest abundance from spring through autumn coincident with its breeding season. B. johnsoni was taken at stations near the sea only twice. Mysidopsis bigelowi, the second most abundant species, occurred in samples from every station, and was in breeding condition throughout the estuaries from late winter to mid-autumn. Metamysidopsis mexicana occurred spradically in samples from 3 stations near inlets, was in breeding condition throughout the year, but appeared to be most abundant in summer and fall. Promysis atlantica appeared infrequently at stations near inlets in all months except Feb. and March, usually in breeding condition. Neomysis americana was the most abundant species, reaching its greatest concentration in samples from middle to upper estuarine stations where spawners were almost always present. Size differentials suggested more than a single generation per year. The species showed no evidence of nocturnal stratification in the shallow 6-m deep estuarine water. Heteromysis formosa occurred sporadically from May-Dec.--Copyright 1973, Biological Abstracts, Inc.
W74-02094

MEASUREMENT OF THE COMPLEX DYNAMIC RIGIDITY OF RECENT MARINE SEDIMENTS,
Naval Postgraduate School, Monterey, Calif.
G. A. Engel.
Available from NTIS, Springfield, Va 22151 AD-758 678 Price $3.00 printed copy; $1.45. M Sc Thesis, December 1972. 78 p, 32 fig, 9 tab, 18 ref.

Descriptors: *Sedimentology, *Sediments, *Continental shelf, *Marine geology, Sampling, Rigidity, Testing procedures, Physical properties, Density, Porosity, Particle size, Shear strength, Computer programs, Correlation analysis, Viscometers, Viscosity.

The dynamic rigidity of 17 samples of continental terrace clayeysilt sediments was measured in the laboratory using viscoelastometer in the frequency range of 7 to 60 kHz. The method involved the progagation of torsional waves on a rod and measuring the effects of shear loading imparted to the rod when imbedded in a sediment. Values of the real component of rigidity ranged from 1,600,000 dynes/sq cm to 21,000,000 dynes/sq cm. Values of the imaginary component of rigidity ranged from 200,000 dynes/sq com to 41,000,000 dynes/sq com. No clear-cut dependence of rigidity upon frequency was observed. Both real and imaginary components of rigidity were analyzed by plotting the data as a function of various other mass-physical properties including: density, porosity, compresional wave speed, sand-silt-clay percentages, vane shear strength, and the product of density and sound speed squared. These analyses substantiate research done by other workers indicating that both real and imaginary components of rigidity exhibit trends with some of the mass-physical properties. (Woodard-USGS)
W74-02146

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

THE REMOVAL OF TOXIC METALS FROM WATER BY REVERSE OSMOSIS,
Research Triangle Inst., Durham, N.C.
For primary bibliographic entry see Field 05D.
W74-01906

HOLLOW FINE FIBERS FOR BRACKISH WATERS SOFTENING,
Monsanto Research Corp., Durham, N.C.
R. L. Leonard, and T. A. Orofino.
Available from the National Technical Information Service as PB-223 384, $4.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 887, September 1973. 39 p, 5 fig, 17 tab, 4 ref. OSW Contract 14-30-2872.

Descriptors: *Membrane processes, Desalination processes, *Desalination, *Reverse osmosis, Water treatment, *Water softening, Pilot plants, *Brackish water.
Identifiers: Hollow fine fiber modules, Cellulose acetate membranes.

Basic procedures developed previously in spinning of high-flux, asymmetric hollow fibers from cellulose acetate were modified to yield systems especially suited for low pressure water softening. Use of alternate solvents, coagulation media, and annealing conditions provided hollow fibers varying in monvalent/divalent salt passage ratio and with markedly improved product water flux as compared with state-of-the-art systems. Laboratory performance of a hollow fiber system especially useful for divalent ion rejection exceeded 10 gfd and 95% rejection of magnesium sulfate at 150 psi, after seven days of uninterrupted test. Several modules, up to 1500 gpd capacity, were fabricated from standard and improved fibers and placed in low-pressure service at OSW field sites. (OSW)
W74-01907

CONTROL OF FOULING OF REVERSE OSMOSIS MEMBRANES WHEN OPERATING ON POLLUTED SURFACE WATERS,
Gulf Environmental Systems Co., San Diego, Calif.
J. E. Beckman, E. Bevege, J. E. Cruver, S. S. Kremen, and I. Nusbaum.
Available from the National Technical Information Service as PB-223 181, $10.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 882, September 1973. 145 p, 65 fig, 15 tab, 7 ref. OSW Contract 14-01-0001-2225.

Descriptors: *Desalination, *Descaling, *Membranes, Pilot plants, *Reverse osmosis, Waste water treatment, Pollution abatement.
Identifiers: *Fouling, Sewage, Chemical cleaners, Spiral would modules.

The purpose was to study the reverse osmosis membranes fouling characteristics of sewage-contaminated surface waters and to develop techniques for prevention and/or cleaning. Laboratory experiments were conducted to characterize sewage-contaminated surface waters and to screen various feed additives. Field tests were run at the Santee Water Reclamation Facility with 3.5 ft2 spiral membrane modules to determine the effects of operating variables such as brine velocity, pressure, brine-to-product flow ratio, and brine channel turbulence. Samples of membranes from these tests were used for laboratory screening of chemical cleaners. Several cleaning techniques were successful for the fouled modules. Sodium perborate, 'Biz' enzyme detergent, and ethylene diamine tetra acetic acid restored the product water flux to 80 to 85% of the initial value (compaction alone has accounted for a 15% flux decline in a previous 200-hr test). In the final stage of the program, the cleaning techniques were tested in the field and compared on the basis of their abilities to maintain product water flux. All three cleaners performed well. The program was concluded with an 1100-hr run at Santee which had a log-log flux decline slope of -0.076 with sodium borate cleaning. A simplified economic analysis indicated that, at the longer-term test conditions, the cleaning cost would be minimal (24 cent/1000 gal.). (OSW)
W74-01908

SEA WATER PILOT PLANT CONSTRUCTION AND OPERATION, .
Envirogenics Co., El Monte, Calif.
S. C. May, and R. A. Tidball.
Available from the National Technical Information Service as PB-223 192, $6.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 878, September 1973. 67 p, 19 fig, 6 tab. OSW Contract 14-30-2871.

Descriptors: *Desalination, Desalination processes, *Reverse osmosis, *Membrane processes, Desalination plants, *Pilot plants, Sea water, Pretreatment, *California.
Identifiers: Tubular modules, Cellulose acetate blend membranes, San Diego (Calif), Polycarbonate return bends.

The construction and operation of a first pass sea water reverse osmosis tubular assembly (as used in a two pass system) and the desalting performance evaluation of cellulose acetate blend membranes under actual field service conditions are described. The system is composed of 1240 tubular elements connected with polycarbonate return bends operating at 1000 psi on pretreated seawater. Membrane performance was satisfactory with an initial flux of 16 gfd and a product salinity of 2000 ppm. A flux decline coefficient of 0.02 was measured for the initial testing period. After initial system check-out, the full complement of 1240 tubes was installed in January 1972 and operated at the OSW San Diego Sea Water Test Facility until April 30, 1972. With this full complement of tubes, a system on-stream factor of 79% was obtained. Recommendations were made for system design changes to improve this to over 90% with primary emphasis on changes to the high pressure pump piping system. (OSW)
W74-01909

DEVELOPMENT OF SECOND GENERATION SPIRAL MEMBRANE REVERSE OSMOSIS ELEMENTS,
Gulf Environmental Systems Co., San Diego, Calif.
G. E. Foreman, S. S. Kremen, W. W. Wight, and T. D. Wolfe.
Available from the National Technical Information Service as PB-223 191, $3.75 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 875, September 1973. 95 p, 41 fig, 21 tab, 6 ref. OSW Contract 14-30-2859.

Descriptors: *Desalination, Desalination processes, *Desalination apparatus, *Reverse osmosis, *Membrane processes, Desalination plants, Pilot plants, Brackish water.
Identifiers: Spiral wound modules, Low pressure, Cellulose acetate membranes, Brine spacer materials.

Development and demonstration of a second generation spiral-would reverse osmosis element were successfully undertaken. The element developed is a nominal 12 inches in diameter, 36 inches long and contains in excess of 550 ft2 of active membrane area. The element contains 20 leaves that are attached together and to the product tube in a novel tributary configuration. While desalting a brackish feedwater at 400 psi, the membrane in the element produces more than 16 gal/ft2-day of purified water while rejecting over 94% of the sodium chloride. Two of these elements were tested on a natural feedwater for 200 and 650 hours. Techniques to reuse expensive components in the element and to restore adequate salt rejection by in-situ reheat treatment of the membrane were also investigated. A low cost filter paper was found that can be used as a replacement for one-half of the woven polyester sailcloth support presently used in the element. Brine spacer materials were also re-evaluated to find a suitable and thinner replacement for the presently used 0.040-in. polymer netting. This resulted in prototypes of a new material that is 0.028 inches thick with apparent performance equal to that of the thicker material. (OSW)
W74-01910

CONCEPTUAL DESIGN OF HOLLOW FINE FIBER SEAWATER REVERSE OSMOSIS DESALTING PILOT PLANT,
Dow Chemical Co., Freeport, Tex.
B. P. Shephard, H. C. Behrens, J. R. Massie, Jr., and W. F. McIlhenny.
Available from the National Technical Information Service as PB-223 267 $10.75 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 873, September 1973. 164 p, 28 fig. OSW Contract 14-30-3113.

Descriptors: *Desalination, Desalination processes, *Reverse osmosis, *Membrane processes, Desalination plants, *Pilot plants, *Sea water, Pretreatment.
Identifiers: Hollow fine fiber modules, Cellulose Triacetate Membranes, Conceptual design.

An engineering study was made to determine the optimum minimum size pilot plant to provide useful scale-up data for hollow fine fiber reverse osmosis seawater desalting plants in the 0.5 to 1.0 mgd range. A conceptual design based on reverse osmosis modules of 2500 gpd capacity, a cost estimate and a construction schedule were developed. A test agenda and time schedule for testing were also formulated. The study showed that (1) The optimum minimum size pilot plant is 50,000 gpd of product water. At 25 percent recovery, a seawater feed of 140 gpm is required. (2) Major test areas are marine fouling control, filtration, residual iron control and removal, high pressure piping, reverse osmosis and materials of construction. (3) The estimated cost of engineering and constructing the pilot plant for the single sand filter configuration is $194,000 and for the dual sand filter $208,000. (4) Engineering, procurement and construction will require ten months, and the test agenda 13 months, with a one-month overlap. (OSW)
W74-01911

TESTING REVERSE OSMOSIS MODULES FOR WASHWATER RECYCLING,
Abcor, Inc. Cambridge, Mass.
For primary bibliographic entry see Field 05D.
W74-01924

INTERACTION OF FEEDWATER COLLOIDS WITH THE SURFACE OF REVERSE OSMOSIS MEMBRANES,
Gulf Environmental Systems Co., San Diego, Calif.
For primary bibliographic entry see Field 05D.
W74-01925

CALCIUM SULFATE SCALE CONTROL IN HIGH TEMPERATURE DESALTING PROCESSES,
California Univ., Los Angeles.
J. Glater, R. L. Dooly, and J. W. McCutchan.
Available from the National Technical Information Service as PB-223 386, $6.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 888, August 1973. 69 p, 9 tab, 19 fig, 27 ref. OSW Contract 14-30-2785.

Descriptors: *Distillation, *Calcium sulfate, *Gypsum, *Anhydrite, *Scaling, *Desalination, Sea water.
Identifiers: Hemihydrate, Magnesium sulfate, Magnesium ion, *Scale control.

Work reported shows excellent scaling threshold improvement in natural sea water concentrates enriched with magnesium chloride. Scaling thresholds of calcium sulfate hemihydrate and anhydrite were evaluated from solubility measurements under equilibrium conditions in natural sea water concentrates over a temperature range between 225 and 340F. These forms of calcium sulfate were chosen as solid phases since both scale modifications may be anticipated in distillation processes at high temperatures. Natural sea water from Marineland, California, was selected for this study because of it clarity and constancy of composition--showing insignificant variation with tide, sea temperature, or season. Calcium and magnesium analysis over a period of years gave average values of 393 ppm and 1297 ppm, respectively. (OSW)
W74-01926

THE WRIGHTSVILLE BEACH, NORTH CAROLINA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS PLANTS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.

Available from the National Technical Information Service as PB-223 582 $4.25 in paper copy; $1.45 in microfiche. Office of Saline Water Research and Development Program Report 891, September 1973. 79 p, 25 fig, 16 tab. OSW Contract 14-30-2833.

Descriptors: Desalination, *Desalination Plants, Desalination Processes, *Membrane Processes, *Pilot Plants, *Reverse Osmosis, *Sea Water, Chlorine, Sands, Diatomaceous earth, *Filtration, Waste water treatment.
Identifiers: *Pretreatment (Water), Manganese Zeolite, Astwated Carbon.

A pilot plant investigation at the OSW Wrightsville Beach Test Facility evaluated the effectiveness of five pretreatment systems in improving the quality of sea water prior to reverse osmosis. Two identical filtration trains provided data for the following pretreatment systems: chlorination; rapid sand; manganese zeolite; and activated charcoal filtration. These were used in different combinations to obtain optimum treatment. Results are presented in tabular form by parameter, average influent, and average effluent. Other general information on adverse raw sea water quality indicates that high levels of suspended solids and organics may occur during the summer and fall, as well as during storms. Throughout the April-June 1972 test period the raw sea water was clear. (OSW)
W74-01931

THE CHULA VISTA, CALIFORNIA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.

Available from the National Technical Information Service as PB-223 594 $4.25 in paper copy; $1.45 in microfiche. Office of Saline Water Research and Development Program Report 890, September 1973. 111 p, 23 fig, 20 tab, 14 ref. OSW Contract 14-30-2833.

Descriptors: Desalination, *Desalination Plants, Desalination Processes, *Membrane Processes, *Reverse Osmosis, *Sea Water, *Pilot plants, *Filtration, Chlorination, Coagulation, Waste water treatment.
Identifiers: Sand Filtration, Activated Carbon Filtration, Diotomaceous Earth Filtration, Alum Coagulation, *Pretreatment methods.

The study investigated sea water pretreatment methods which could be used in conjunction with reverse osmosis desalination to prolong membrane effectiveness. The investigation consisted of: (1) Bench-scale tests to determine optimum application of coagulants, chlorine and possible need for pH adjustments; (2) Pilot plant test to determine the effect of hydraulic loading; (3) Pilot plant test to determine the effects of chlorination, alum coagulation, settling, sand, manganese-zeolite, granular activated carbon and diatomaceous earth pressure filters; and (4) a two-week continuous run to determine the performance of the above mentioned filters under prolonged operation. The study showed that chlorination, sand pressure filtration and activated carbon filtration were sufficient to obtain the desired water quality of less than 1 JTU turbidity at all times during the test period. The bench-scale tests indicated that alum coagulation and settling provide satisfactory clarification. (OSW)
W74-01932

DEVELOPMENT OF POLYAMIDE MEMBRANES FOR SEA WATER DESALINATION,
Chemstrand Research Center, Inc., Durham, N.C.
R. McKinney, Jr., W. L. Hofferbert, and J. A. Carden.
Available from the National Technical Information Service as PB-223 385 $3.25 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Program Report 886, September 1973. 18 p, 4 fig, 7 tab, 2 ref. OSW Contract 14-30-2868.

Descriptors: *Desalination, Desalination Processes, *Membrane Processes, *Reverse Osmosis, *Sea water.
Identifiers: *Aromatic polyamides, Ionic cross-linking, Tubular Membranes.

The use of cross-linking based on ionic bonds has been successfully employed in membranes prepared from aromatic polyamides for the improvement of long-term flux stability. Typical flux and compaction rate performance ranged for the ionically cross-linked flat films operating at 1500 psi with sea water are: J1 (gfd); d log J1/d log t 14.2; -0.09 to 10.2; -0.02 at a sodium chloride rejection of 99.4%. Preliminary data taken for seamless tubular membranes indicate a performance level of 7 gfd and 99.3% rejection at a compaction rate of -0.03 under comparable conditions of reverse osmosis. (OSW)
W74-01933

BRACKISH WATER DESALTING TESTING AND EVALUATION PROCEDURES WITH MODILE TEST FACILITY,
Burns and Roe Construction Corp., Paramus, N.J.
E. I. Ewoldsen, M. H. Jhawar, and P. Mothes.
Available from the National Technical Information Service as PB-223 352 $18.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 885, September 1973. 296 p, 103 fig, 88 tab. OSW Contract 14-30-2592.

Descriptors: *Desalination, Desalination Processes, Descaling, *Electrodialysis, *Membrane Processes, Pilot Plants, *Reverse Osmosis, *Brackish water.
Identifiers: Hollow Fine Fiber Modules, Spiral Wound Modules.

A mobile brackish water test facility was established to demonstrate the ability of reverse osmosis and electrodialysis processes to produce potable water from brackish water in the Southwest United States. Commercially available equipment was employed. The reverse osmosis units consisted of tubular, spiral wound, and hollow fine fiber modules with capacities from 300 to 5000 GPD. Tests were made to determine problems of operation at high recovery, or conditions under which scaling might occur. Pretreatment consisted of removing calcium and magnesium, sediment filtration, iron and manganese removal and organic material removal. The flux decreases observed were due largely to fouling and scaling. Flushing the unit restored the flux except where calcium sulfate was encountered. Salt rejection was not seriously affected by fouling except in the case of the hollow fine fiber units, where decreases of 5 to 10% were noted. Tubular units with turbulence promoters were least affected by scaling. Electrodialysis unit was operated successfully on two low salinity wells. Iron and calcium sulfate buildup gave some problems. Operation on high salinity wells was marginal. (OSW)
W74-01934

INVESTIGATION OF THE EFFECT OF COATINGS ON THE FAILURE MECHANISMS OF FIBERGLASS YARN IN TUBULAR REVERSE OSMOSIS SUPPORTS,
Philco-Ford Corp., Newport Beach, Calif.
R. H. Williams, A. O. Brodie, C. H. Lewis, J. S. Field, and J. C. Britt.
Available from National Technical Information Service as PB-223 382 $6.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 884, September 1973. 80 p, 23 fig, 11 tab, 7 ref. OSW Contract 14-30-2844.

Descriptors: *Desalination, Desalination processes, *Membrane processes, *Reverse osmosis.
Identifiers: *Tubular modules, Fiberglass yarns, Yarn coatings, Fluorocarbon coatings, Helical tubular segments.

The objective of this program was to increase the lifetime of braided pressure supports used in reverse osmosis tubular modules by means of selection of the most appropriate fiberglass yarns and yarn coatings. A mathematical model has been developed to allow a more analytical approach to yarn selection and braided pressure support design. An extensive body of yarn test data has been generated in the evaluation of potential yarns and coatings. This includes results of tensile tests of wet and dry specimens, abrasion/flexure tests, microphotographs of yarn cross-sections, and accelerated life cycle tests of braided pressure supports. The most promising yarns appear to be those which are composite strands of polyester and fluorocarbon coated glass. Thermosetting acrylic impregnants coupled with fluorocarbon top coats were found to be the most effective in preserving glass yarnstrength in a wet environment. (OSW)
W74-01935

TUBULAR REVERSE OSMOSIS MEMBRANE DEVELOPMENT USING SULFONATED POLYPHENYLENE OXIDE,
General Electric Co., Lynn, Mass.
P. J. Chludzinski.
Available from National Technical Information Service as PB-223 196 $3.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 881, September 1973. 64 p, 14 fig, 7 tab. OSW Contract 14-30-2824.

Descriptors: *Desalination, Desalination Processes, *Reverse Osmosis, *Membrane Processes, Oxides.
Identifiers: *Tubular membranes, Porous polypropylene substrate, Laboratory study.

Work was conducted to develop reverse osmosis tubular elements composed of PPO-SO3H membranes cast onto porous substrates and held in standard porous fiberglass backing tubes. Results showed the feasibility of using hydrophobic grade of porous polypropylene as substrate. The tubular membrane/substrates demonstrated integral films of polymer on the substrate which were rugged and easily handled. As to performance, flux and rejections (based on feed) were about 40 gfd and 90%. Full sized tubes at 600 psi and 80F (Webster, S.D. water) showed about 7 to 8 gfd at about 85% refection. The performance of full-sized tubes was always lower than flat sheet counterparts cut from the tubes after full-sized tube sheets. Tests with flat sheets of the meniscus-coated membrane on porous polypropylene using secondary sewage showed the ability to regenerate the system after fouling. At 500 psi and 85F, initial flux was 10 fgd with sodium ion rejection about 85%, and chemical oxygen demand rejection about 97%. It was concluded that because of the PPO-SO3Na membraned resistance to high temperature and corrosive chemicals, it would be a good candidate for use on secondary sewage. (OSW)
W74-01936

FURTHER DEVELOPMENTS OF WATER DESALINATION SYSTEMS BASED ON LARGE SPIRAL-WOUND REVERSE OSMOSIS MEMBRANE ELEMENTS,
Gulf Environmental Systems Co., San Diego, Calif.
G. E. Forman, S. S. Kremen, W. W. Wight, and T. D. Wolfe.
Available from the National Technical Information Service as PB-223 420 $5.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 880, April 19. . 120 p, 52 fig, 21 tab, 2 ref. OSW Contract 14-30-2641.

Descriptors: *Desalination, Desalination Processes, *Reverse Osmosis, *Brackish Water, *Membrane Processes, Pilot Plants, Membranes.
Identifiers: *Cellulose Acetate Membranes, Spiral Wound Modules, Membrane Supports.

Work was directed toward attaining the capability to produce on a volume basis large spiral-wound membrane elements with membrane cast directly on the support fabric. A major effort was devoted to casting membranes on woven Dacron sailcloth, with additional effort on lower cost support materials such as nonwoven Dacron fabrics and papers. The main objective of this effort was to develop high-refection, compaction-resistant membrane elements capable of producing a minimum water flux of 16 gal/ft2 of membrane area per day at 600 psi from a natural feedwater after 10,000 hrs of operation. This objective was attained with membrane elements fabricated from a formamide membrane formulation cast on D-601 sailcloth. These membrane elements were tested on pretreated San Diego tap water for more than 2500 hrs. Salt refection capability throughout the test was approximately 96.5%. Using the flux decline slope obtained for these membrane elements during the testing run (2500 hrs), the calculated water flux would be greater than 17 gal/sq ft day after 10,000 hrs. of operation at 600 psi. (OSW)
W74-01937

COMPUTER SYSTEM FOR THE DESCRIPTION AND EVALUATION OF COMMUNITY WATER SYSTEMS BASED ON REVERSE OSMOSIS DESALINATION,
Digital Systems Corp., Hanover, N.H.
S. A. Gembicki, R. L. Brewster, P. W. Weaver, and P. T. Shannon.
Available from the National Technical Information Service as PB-223 184 $7.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 876, September 1973. 311 p, 51 fig, 7 tab, 12 ref. OSW Contract 14-30-2783.

Descriptors: *Desalination, Desalination Processes, *Reverse Osmosis, Economic Impact, *Cost Analysis, *Brackish Water, Systems Analysis, *Computer Programs, *Water supply, Community development.

A modular digital computer system has been developed for the analysis of specific community brackish water needs. The system provides an analytical tool to facilitate individual communities to determine the cost effective total water system best suited for their specific requirements. The system provides current technology and cost information as well as a highly flexible format which readily facilitates incorporation of new and projected desalting technology. The system is a set of unit programs which perform all engineering and financial calculations for the individual basic components of a water supply system: well, pretreat, pump, reverse osmosis plant, pipe, pond, etc. Other unit programs perform cost summaries and community financial analysis which compute bond repayment schedules and their relation to projected per capita income, population, and real estate values. (OSW)
W74-01938

3B. Water Yield Improvement

LIDAR EVALUATION OF FOG DISSIPATION TECHNIQUES,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 02B.
W74-01888

WEATHER MODIFICATION OPERATIONS IN CALIFORNIA, OCTOBER 1, 1969--SEPTEMBER 30, 1970,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
M. M. Schwartz, and J. B. Powers.
Available from State of Calif, Documents Section, P.O. Box 20191, Sacramento, Calif 95820 Price $1.00. Bulletin No 16-70, July 1971. 20 p, 3 plate, 5 tab.

Descriptors: *Weather modification, *Artificial precipitation, *Cloud seeding, *California, Projects, Data Collections, Silver iodide, Polyelectrolytes, Surfactants, Fog.
Identifiers: Fog dispersion, Airport.

Weather modification operations were conducted in 10 areas in California during the 1969-70 water year by 9 licensed operators. A project undertaken to suppress fog at the Los Angeles International Airport made use of polyelectrolytes and surfactants. The rest of the projects used silver iodide in various forms to induce precipitation and otherwise modify atmospheric conditions. Four of the licensees acted on their own behalf; the remainder were employed by governmental agencies and public utilities. A long-term program conducted by the Santa Clara County Flood Control and Water District was suspended during the 1969-70 water year because the water supply carried over from the previous year was considered ample. (Woodard-USGS)
W74-01947

SEASONAL CHANGES IN SODIUM AND CHLORIDE CONCENTRATION OF SALTBUSH (ATRIPLEX SPP.) LEAVES AS RELATED TO SOIL AND PLANT WATER POTENTIAL,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Riverina Lab.
For primary bibliographic entry see Field 02I.
W74-02105

3C. Use of Water of Impaired Quality

WATER-SALT BALANCE OF SALINE SOILS UNDER IRRIGATION AT THE FOOTHILL PLAINS OF GOLODNAYA STEPPE, (IN RUSSIAN).
Moscow State Univ. (USSR). Dept. of Pedology.
For primary bibliographic entry see Field 02G.
W74-01753

UPTAKE OF SODIUM, CALCIUM, AND CHLORINE BY COTTON PLANTS DURING IRRIGATION WITH A SOLUTION SIMILAR TO SEA WATER, (IN RUSSIAN),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
M. K. Mel'nikova, S. R. Tagaev, and I. F. Zubareva.
Fiziol Rast. Vol 19, No 2, p 396-401, 1972. Illus. (English summary).
Identifiers: *Calcium, *Chlorine, *Cotton plants, Irrigation, *Sodium, Soils, Toxicity, Turgor, Cations.

Cotton plants were grown under vegetative conditions and irrigated with solutions similar to sea water and with monocationic solutions of different concentration, in order to establish limiting concentrations of the balanced and monocationic solutions killing the cotton plants. The toxic effect of the monocationic solutions was manifested at lower concentrations (10 g/l) than that of the balanced solutions. In soil experiments the irreversible loss of turgor in the plants was found at the concentration of irrigating solutions of 30 g/l. Such elevated resistance of the plants is due to the protecting effect of cations contained in the soil solution.--Copyright 1973, Biological Abstracts, Inc.
W74-01766

WATER RESOURCE PRESERVATION BY PLANNED RECYCLING OF TREATED WASTEWATER,
Culp, Wesner, Culp-Clean Water Consultants, Corona Del Mar, Calif.
For primary bibliographic entry see Field 05D.
W74-01866

3D. Conservation in Domestic and Municipal Use

METHODOLOGIES FOR FLOW PREDICTION IN URBAN STORM DRAINAGE SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-01656

ARID URBAN WATER MANAGEMENT: SOME ECONOMIC, INSTITUTIONAL AND PHYSICAL ASPECTS,
Nevada Univ., Reno. Desert Research Inst.; and Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 06B.
W74-01662

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS-VOLUME VII: CONFLICT AND

CHOICE: MULTIOBJECTIVE WATER--RESOURCES PLANNING,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 06A.
W74-01784

URBAN GROWTH AND THE WATER REGIMEN. HYDROLOGIC EFFECTS OF URBAN GROWTH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04C.
W74-01847

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.
For primary bibliographic entry see Field 06F.
W74-01850

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-01852

BOISE METROPOLITAN AREA SANITARY SEWAGE COLLECTION AND TREATMENT FACILITIES: PHASE II REPORT.
J-U-B Engineers, Inc., Boise, Idaho; and Barton, Stoddard, Milhollin and Higgins, Boise, Idaho.
For primary bibliographic entry see Field 05D.
W74-01854

MISSISSIPPI/MINNEAPOLIS-A PLAN AND PROGRAM FOR RIVERFRONT DEVELOPMENT.
Riverfront Planning Team of Minneapolis Planning and Development, Minn.

1972. 130 P, 80 FIG, PHOTOS, 5 TAB, 53 REF, APPEND.

Descriptors: *Comprehensive planning, Water resources development, Rivers, *Land use, Multipurpose projects, Recreation facilities, *Minnesota, *Mississippi River.
Identifiers: *Riverfront development, Open space, Water/land interface, *Minneapolis (Minn).

This comprehensive plan for Riverfront rejuvenation utilizes the functional and visual frameworks of leisure activity, housing, industry and commerce, movement, environmental quality and environmental design in coordinating the development of the total Riverfront and each of its subareas. Key to creating a new river image, for providing a development framework and inducing further improvement efforts are Nicollet Island, Main Street, and East Bank Residential Development. Nicollet Island will be a primary public open space, with green spaces interwoven with manmade canals, pedestrian and cycling paths, and an historic village. a learning center, and an amphitheater. Main Street will be a mixed residential/commercial district, where the historic character of the area will be strongly perserved. Further residential development on the East Bank between Main Street and University Avenue will provide necessary support for the commercial and recreational foci, while in turn complimented by them. The upper Riverfront will be reserved for river oriented industrial usage. Along with new land use arrangement, a comprehensive movement system for vehicular, pedestrian, and cycling access will be developed. Vehicular access is essential for attracting people from the larger geographical areas while pedestrian and cycling paths will link the various nodes of land use along the river itself. Riverfront redevelopment will be a 20-25 year effort involving both public and private investment programs. Details of the development in terms of both subareas and functional and visual frameworks are discussed with the aid of numerous explicit graphics. (Hoffman-North Carolina)
W74-01855

THE ADAPTED PUBLIC INVESTMENT MODEL WITH PARTICULAR REFERENCE TO THE WATER RESOURCE SECTOR IN METROPOLITAN DEVELOPMENT,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 06C.
W74-01862

A CONSERVATION ELEMENT FOR THE SACRAMENTO GENERAL PLAN.
Sacramento City Planning Commission, Calif.
For primary bibliographic entry see Field 06G.
W74-01864

WATER RESOURCE PRESERVATION BY PLANNED RECYCLING OF TREATED WASTEWATER,
Culp, Wesner, Culp-Clean Water Consultants, Corona Del Mar, Calif.
For primary bibliographic entry see Field 05D.
W74-01866

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, PRIORITIES FOR THE RIVERBANKS PLAN.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01871

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, RECREATION, OPEN SPACES, RIVERBANKS.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01872

WATER DEMAND OF SINGLE DWELLING RESIDENCES (DEMANDE EN EAU DE RESIDENCES UNIFAMILIALES),
For primary bibliographic entry see Field 06D.
W74-02045

ECONOMIC GUIDELINES FOR PUBLIC UTILITIES PLANNING,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-02114

VACATION HOME LOCATION: A MODEL FOR SIMULATING THE RESIDENTIAL DEVELOPMENT OF RURAL RECREATION AREAS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 06B.
W74-02115

COMPREHENSIVE SEWERAGE PLAN FOR GRAND ISLAND, NEBRASKA.
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W74-02123

TECHNICAL AND ECONOMIC EVALUATION OF EXISTING WASTEWATER TREATMENT FACILITIES AND ALTERNATIVE METHODS OF DISPOSAL OF TREATED EFFLUENT, HOUSTON, MISSOURI.
Bartholomew (Harland) and Associates, St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02125

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 04A.
W74-02129

WATER SUPPLY AND SEWERAGE SERVICES: TOOLS FOR AFFECTING THE QUALITY OF LIFE IN FORSYTH COUNTY, N.C., VOLUME D IN THE LAND POTENTIALS SERIES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02130

UNITARY WATER SUPPLY AND SEWERAGE SERVICES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02131

MUNCIE INDIANA'S 'TOTAL' LOCAL WATER QUALITY PROGRAM,
Muncie Sanitary District, Ind. Water Quality Div.
For primary bibliographic entry see Field 05B.
W74-02132

MUNCIE SANITARY DISTRICT, 1972, 8TH ANNUAL REPORT.
Muncie Sanitary District, Ind.
For primary bibliographic entry see Field 05D.
W74-02133

AN OLD PIPE LINE BROUGHT BACK TO LIFE,
Westchester County Water Agency, White Plains, N.Y.
For primary bibliographic entry see Field 08F.
W74-02134

COMPARISON OF SEWER DISCHARGE HYDROGRAPHS COMPUTED FROM IN--SEWER MEASUREMENTS AND FROM SYNTHESIZED HYDROGRAPH PROCEDURES, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02135

3E. Conservation in Industry

RELATION OF ERTS-1 DETECTED GEOLOGIC STUCTURE TO KNOWN ECONOMIC ORE DEPOSITS,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 07C.
W74-01707

STRUCTURAL GEOLOGICAL ANALYSIS OF NEVADA USING ERTS-1 IMAGES: A PRELIMINARY REPORT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01709

REGIONAL TECTONIC CONTROL OF TERTIARY MINERALIZATION AND RECENT FAULTING IN THE SOUTHERN BASIN RANGE PROVINCE, AN APPLICATION OF ERTS-1 DATA,
Argus Exploration Co., Newport Beach, Calif.
For primary bibliographic entry see Field 07C.
W74-01710

THE STEEL INDUSTRY AND ENVIRONMENTAL QUALITY.
National Industrial Pollution Control Council, Washington, D.C. Steel Sub-Council.
For primary bibliographic entry see Field 05G.
W74-01841

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS. PART III.
Booz-Allen Public Administration Services, Inc., Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-01844

EXPERIMENTAL RESULTS FROM PROCESSING GASBUGGY GAS IN A NATURAL GAS PROCESSING PLANT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05B.
W74-02021

FLOOD PROTECTION FOR MISSOURI BOTTOMS.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 04A.
W74-02128

3F. Conservation in Agriculture

BIBLIOGRAPHY ON OPTIMIZATION OF IRRIGATION SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
D. D. Meredith.
Available from the National Technical Information Service as PB-225 478/7, $in paper copy; $1.45 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 71, September 1973, 123 p, 1,918 ref. OWRR B-084-ILL (1), 14-31-0001-4080.

Descriptors: *Irrigation systems, *Bibliographies, *Optimization, Alphalfa, Beans, Corn, Cotton, Grasses, Potatoes, Rice, Soybeans, Tobacco, Tomatoes, Wheat.
Identifiers: Fruit crops, *Crop response, *Plant physiology.

This bibliography contains 1,918 literature references pertaining to optimization of irrigation systems. The references are listed alphabetically by author for the following topics: plant response to physical environment; and methodologies for optimization.
W74-01657

IDENTIFICATION OF WINTER WHEAT FROM ERTS-1 IMAGERY,
Kansas Univ./Center for Research, Inc., Lawrence.
D. L. Williams, S. A. Morain, B. Barker, and J. C. Coiner.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Report NASA SP-327, p 11-18, 1973. 4 fig, 1 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Wheat, *Kansas, Land use, Crops, Surveys, Mapping, Data collections.
Identifiers: ERTS.

By interpretation of ERTS-1 data in Finney County, Kansas, winter wheat can be successfully identified. This successful identification is based on recognition of tonal signatures on MSS images. Several different but highly successful interpretation strategies involve the use of both spectral and temporal inputs. Good results were obtained from a single MSS-5 image acquired at a critical time in the crop cycle (planting). On a test sample of 54,612 acres, 89% of the acreage was correctly classified as wheat or nonwheat, and the estimated wheat acreage (19,516 acres) was 99% of the actual acreage of wheat in the sample area. (See also W74-01663) (Knapp-USGS)
W74-01665

SEMI-AUTOMATIC CROP INVENTORY FROM SEQUENTIAL ERTS-1 IMAGERY,
California Univ., Riverside. Dept. of Geography.
C. W. Johnson, and V. B. Coleman.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 19-25, 1973. 1 fig, 2 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *California, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification.

A newly introduced crop in the Imperial (California) Valley can be detected by sequential ERTS-1 imagery. Individual crop types can be identified by remote sensing techniques. A system for the identification of field conditions enables the production of a statistical summary within two to three days of receipt of the ERTS-1 imagery. The summary indicates the total acreage of producing crops and irrigated planted crops currently demanding water and further indicates freshly plowed fields that will be demanding water in the near future. Relating the field conditions to the crop calendar of the region by means of computer techniques provides specific crop identification for the 8,000 plus fields. (See also W74-01663) (Knapp-USGS)
W74-01666

CROP IDENTIFICATION USING ERTS IMAGERY,
South Dakota State Univ., Brookings. Remote Sensing Inst.
M. L. Horton, and J. L. Heilman.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 27-33, 1973. 4 fig, 1 tab, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *South Dakota, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, Crop identification.

Digital analysis of August 15 ERTS-1 imagery for southeastern South Dakota was tested to determine the feasibility of conducting crop surveys from satellites. Selected areas of bands 4,5,6, and 7 positive transparencies were converted to digital form utilizing signal analysis and dissemination equipment. The optical transmission values were printed out in a spatial format. Visual analysis of the printouts indicated that cultivated areas were readily distinguished from non-cultivated areas in all four bands. Bare soil was easily recognized in all four bands. Corn and soybeans, the two major crops in the area, were treated as separate classes rather than as a single calss called row crops. Bands 6 and 7 provided good results in distinguishing between corn and soybeans. (See also W74-01663) (Knapp-USGS)
W74-01667

IDENTIFICATION OF LARGE MASSES OF CITRUS FRUIT AND RICE FIELDS IN EASTERN SPAIN,
F. Lopez de Sagredo, and F. G. Salinas.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 35-36, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Citrus fruits, *Rice, Land use, Surveys, Mapping, Data collections.
Identifiers: ERTS, *Crop identification, *Spain.

ERTS-1 imagery has been successfully used for the identification of large areas of citrus groves and rice fields in the Valencia region of eastern Spain. Results are encouraging and will facilitate the elaboration of a land use map with a fair degree of definition once methods prove to be fully operational. (See also W74-01663) (Knapp-USGS)
W74-01668

ENGINEERING ANALYSIS OF ERTS DATA FOR SOUTHEAST ASIAN AGRICULTURE,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
H. L. Heydt, and A. J. McNair.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 37-52, 1973. 12 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Rice, Asia, Land use, Surveys, Mapping, Data collections.
Identifiers: *Philippines, *Crop identification, ERTS.

To apply ERTS data to rice fields in the Philippines, two primary study objectives are to establish the feasibility of extracting from ERTS imagery the areas where rice is grown, and to determine those measurements on the imagery which enable the assessment of crop condition. Achieving these objectives with procedures which can be cost-effective can lead the way toward yield prediction, irrigation system management, and similar functions which are known to be important needs in Southeast Asia. (See also W74-01663) (Knapp-USGS)
W74-01669

AN INTERREGIONAL ANALYSIS OF NATURAL VEGETATION ANALOGUES USING ERTS-1 IMAGERY,
Earth Satellite Corp., Berkeley, Calif.
C. E. Poulton, and R. I. Welch.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept SP-327, p 53-57, 1973. 1 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Rice, Louisiana, California, Land use, Surveys, Mapping, Data collections.
Identifiers: *Crop identification, ERTS.

In ERTS-1 imagery, in the proper seasons, rice has a unique signature and within-field variation that is related to cultivation. Unique signatures were also found for four natural vegetation types from color prints, and some promising color additive analytical techniques are being developed. (See also W74-01663) (Knapp-USGS)
W74-01670

VALUATION OF REMOTE SENSING IN CONROL OF PINK BOLLWORM IN COTTON,
alifornia Univ., Riverside. Citrus Research enter and Agricultural Experiment Station.
. B. Coleman, C. W. Johnson, and L. N. Lewis.
: Symposium on Significant Results Obtained om the Earth Resources Technology Satellite-1: ol I--Technical Presentations, Sect A, National eronautics and Space Admin Rept NASA SP-7, p 127-133, 1973. 3 fig. NASA Contract NAS 5-771.

escriptors: *Remote sensing, *Satellites (Artifial), *Cotton, *Pest control, *California, Insect ntrol, Data collections, Surveys.
entifiers: ERTS, *Pink bollworm.

here are approximately 800,000 acres of cotton in alifornia, and they are mapped yearly by ground rvey teams. A more practical means of accomishing that objective seemed necessary, and tellite data form ERTS-1 was considered a via e alternative. Cotton in the Imperial, Coachella, d Palo Verde Valleys is heavily infested by the nk bollworm which affects both the quantity and ality of cotton produced. The California State epartment of Agriculture, therefore, has regued the growing season of cotton by establishing anting and plowdown dates. These procedures sure that the larvae, whose diapause or resting riod occurs during the winter months, will have plant material on which to feed, thus inhibiting ring moth emergence. The ERTS-1 multispectral anner (MSS) data are being analyzed to deterine which combinations of dates and colors will entify cotton fields and thus provide the data eeded to produce maps of the fields for the rthcoming cotton season. (See also W74-01663) Knapp-USGS)
74-01679

PPLICATION OF ERTS-1 IMAGERY AND UNERFLIGHT PHOTOGRAPHY IN THE DETECION AND MONITORING OF FOREST INSECT NFESTATIONS IN THE SIERRA NEVADA OUNTAINS OF CALIFORNIA,
atural Resources Management Corp., Berkeley, alif.
. C. Hall.
: Symposium on Significant Results Obtained om the Earth Resources Technology Satellite-1: ol I--Technical Presentations, Sect A, National eronautics and Space Admin Rept NASA SP-7, p 135-142, 1973. 3 fig.

escriptors: *Remote sensing, *Satellites (Artifial), *Cotton, *Pest control, *California, Insect ntrol, Data collections, Surveys.
entifiers: ERTS, *Pink bollworm.

reliminary analysis of ERTS-1 imagery in a gged mountain area in the Sierra Nevada Mounins of California indicates some promising possilities of detecting two types of insect infestaons. Detecting and mapping other features such timber or untimbered areas, timber stand densi, principal stream courses, mountain meadows, kes, massive rock outcrop, rock domes, riparian egetation, grazing land, and glaciers is also feasie. (See also W74-01663) (Knapp-USGS)
74-01680

PPLICATION OF ERTS-1 DATA TO ANALYS OF AGRICULTURAL CROPS AND ORESTS IN MICHIGAN,
ichigan Agricultural Experiment Station, East ansing.
. R. Safir, W. L. Myers, W. A. Malila, and J. P. lorgenstern.
: Symposium on Significant Results Obtained om the Earth Resources Technology Satellite-1: ol I--Technical Presentations, Sect A, National eronautics and Space Admin Rept NASA SP-7, p 173-180, 1973. 2 fig, 2 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Surveys, *Crops, *Forests, Land use, Mapping, Data collections, Data processing, *Michigan.
Identifiers: *Crop identification, ERTS.

ERTS data were collected over southwestern Lower Michigan on August 25, 1972. Major agricultural crops such as corn and soybeans were approaching maturity at this date and forest canopies were dense. Extensive ground truth information was gathered by detailed field study of test strips. This detailed information was supplemented over larger areas by interpretation of photography and MSS imagery. The U.S.D.A.-A. S. C. S. also cooperated by providing information on crops from their records. The recognition process was successful for each type of vegetation which had a dense green canopy such as forests, corn, and soybeans. Bare soil was also recognizable as a category. However, recognition of species was difficult in senescing or senescent vegetation. Since the accuracy of recognition depends on stage of growth, optimum times for collecting data will vary from one crop to the next. (See also W74-01663) (Knapp-USGS)
W74-01684

CROP SPECIES RECOGNITION AND MENSURATION IN THE SACRAMENTO VALLEY,
Environmental Research Inst. of Michigan, Ann Arbor.
F. J. Thomson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 181-188, 1973. 2 fig, 2 tab, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *California, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification, *Sacramento Valley.

Crop recognition maps were generated by applying multispectral pattern recognition technique to ERTS-MSS digital taped data. The results were improved and extended by field studies. The mensuration accuracy is affected by the presence of an edge effect surrounding nearly all fields. Using a processing technique to estimate the proportions of unresolved objects in this edge region improves mensuration capability. (See also W74-01663) (Knapp-USGS)
W74-01685

THE RESULTS OF AN AGRICULTURAL ANALYSIS OF THE ERTS-1 MSS DATA AT THE JOHNSON SPACE CENTER,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
R. M. Bizzell, L. C. Wade, H. L. Prior, and B. Spiers.
In: Symposium on Significant Results Obtained from the Earth Resources TechnologySatellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 189-196, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *California, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification, *San Joaquin Valley (Calif).

An area in the San Joaquin Valley was submitted to an intensive evaluation of ERTS data to discriminate between crop types and to provide a reasonably accurate area measurement of agricultural features of interest. ERTS-1 MSS data can provide identifications and extent of agricultural lands and field crop types. Later data sets of Hardin Co., Iowa, and Holt Co., Nebraska, have undergone preliminary analyses as a portion of a joint USDA/ASCS-NASA/JSC ERTS-1 data evaluation project. These preliminary results using the same techniques as those carried out on the Monterey data show an ability to descriminate major crops which are representative of different agricultural practices. (See also W74-01663) (Knapp-USGS)
W74-01686

AGRICULTURAL APPLICATIONS OF ERTS-1 DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
W. C. Draeger.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 197-204, 1973. 1 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *California, *Urbanization, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification.

A satellite sensing system, with which large areas of land can be surveyed in their entirety on one image and which can provide uniform worldwide coverage with a relatively small number of images, offers great promise as a data collection tool. ERTS makes possible regular, frequent observations of each spot on the earth's surface, and provides a service which would be totally infeasible using conventional techniques. An experiment is being performed in Maricopa County, Arizona, and San Joaquin County, California, in cooperation with State and federal agencies. Delineations of land use were meaningful on a quantitative basis. Furthermore, the method of data collection proved to be quite efficient. The use of satellite imagery in monitoring the shift of land use in agricultural areas has been investigated using coverage of the Maricopa County test site acquired both from Apollo 9 and from ERTS-1. All of the agricultural land shifts were to urban uses of various kinds, mostly urban residential usage. The total agricultural acreage shift into urban usage was computed to be approximately 28,160 acres, indicating an average annual shift of approximately 9,400 acres of agricultural land coverted to urban use each year. A survey of safflower fields in a portion of the San Joaquin County, California, test site was carried out using human photo interpreters. The identification test produced an 83% correct identification. An interpreter can detect and delineate individual fields on the imagery. Computerized systems can produce fast and accurate crop classifications, a potentially powerful tool for the collection of agricultural information on a regional basis. (See also W74-01663) (Knapp-USGS)
W74-01687

IDENTIFICATION OF AGRICULTURAL CROPS BY COMPUTER PROCESSING OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
M. E. Bauer, and J. E. Cipra.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 205-212, 1973. 3 fig, 5 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Illinois, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification.

Computer-processed ERTS MSS data classifications accurately identify crop species (corn and soybeans). The classifications of satellite data over a 2,000 square-mile area in northern Illinois not only covered more than 100 times the area

previously covered using aircraft but also yielded improved results through the use of temporal and spatial data in addition to the spectral information. Comparisons of acreage estimates from ERTS data and ground-based systems agreed well. The results demonstrate the potential utility of this technology for obtaining crop production information. (See also W74-01663) (Knapp-USGS)
W74-01688

IDENTIFICATION AND MAPPING OF SOILS, VEGETATION, AND WATER RESOURCES OF LYNN COUNTY, TEXAS BY COMPUTER ANALYSIS OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
M. F. Baumgardner, S. J. Kristof, and J. A. Henderson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 213-221, 1973. 7 fig, 1 tab.

Descriptors: *Remote sensing, *Satellite (Artificial), *Crops, *Texas, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification, *Lynn County (Tex).

ERTS MSS data were tested for mapping and monitoring soil, vegetation, and water resources in Lynn County, Texas. Using computer-implemented overlay techniques, ERTS MSS data obtained on three different dates were analyzed. Temporal changes in vegetation and water supply in Lynn County were identified and mapped. Features which were identified include row crops, unimproved and improved rangelands, bare soils, hydroligic features, and gross geologic and soils features. These techniques may be used to identify drought and other crop stress conditions, crops damaged by hailstorms, areas of active wind erosion, crop species, and soil patterns. (See also W74-01663) (Knapp-USGS)
W74-01689

CAPABILITY OF ERTS-1 IMERGY TO INVESTIGATE GEOLOGICAL AND STRUCTURAL FEATURES IN A SEDIMENTARY BASIN (BASSIN PARISIEN, FRANCE),
Bureau de Recherches Geologiques et Minieres, Orleans (France). Departement Carte Geologique et Geologie Generale.
C. Cavelier, J-Y. Scanvic, G. Weecksteen, and A. Ziserman.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 273-282, 1973. 3 fig, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, Structural geology, Exploration, Geology, Data collections, Aerial photography, Surveys.
Identifiers: ERTS, *France (Paris basin).

A preliminary study of ERTS MSS imagery is in progress on the Paris sedimentary basin. Crops and natural vegetation are well distributed over the site. The main geological units and detected or enhanced by agricultural land use and natural vegetation. Alluvial deposits are outlined by grass and poplar trees. Some spatial relationship of geological stuctures may be identified or extended by using results from different spectral bands. (See also W74-01663) (Knapp-USGS)
W74-01695

WATER MANAGEMENT USING SUBSURFACE DRAINS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
J. Kriz, and R. Skaggs.
Journal of Soil and Water Conservation, Vol 28, No 5, p 216-218, September-October 1973 4 fig, 3 ref .

Descriptors: *Irrigation, *Tile drainage, Land management, Water control, Drainage systems, Irrigation systems, Infiltration, Soil water movement, *Water table, *Southern U.S., *Subsurface drains.

Because natural conditions along the southeastern coast of the U.S. allow manipulation of the water table, a combination of irrigation and drainage is feasible for increasing crop and forest yields. The associated costs of installing the system can be divided between the two practices. The natural conditions that must exist for this type of water management include the following: an impermeable layer or a permanent water table at a rather shallow depth to prevent excessive seepage losses; nearly flat land, otherwise the water table might be at an optimum depth on one side of a field while plants suffer from too much or too little water on the other side; a high soil hydraulic conductivity; and a readily available source of water. Field experiments on a Lumbee sandy loan with a 50-foot drain spacing showed that water can be supplied to the root zone of a crop at a more than sufficient rate. Optimal drain spacing was 63 feet for crops requiring a water table depth of 24 to 63 inches. (Knapp-USGS)
W74-01717

THE DIFFUSION RESISTANCE AND WATER STATUS OF LEAVES OF BETA VULGARIS,
Nottingham Univ. (England). Dept. of Physiology and Environmental Studies.
P. V. Biscoe.
J Exp Bot, Vol 23, No 77, p 930-940, 1972, Illus.
Identifiers: Beta-vulgaris, *Diffusion porometer, *Leaves, Soils, *Sugar beet leaves, Water status, Water potential.

Pot-grown sugar-beet plants were deprived of water in 2 experiments until they wilted completely. Leaf resistance to water-vapor transfer was measured directly with a diffusion porometer and compared with values calculated from measurements of transpiration. There was good agreement between the 2 estimates. Leaf turgor-pressure decreased only gradually due, apparently, to an increase in tissue-solute concentration with increasing water deficit. Relationships between leaf water potential, soil water potential, and leaf resistance were established and the effective control of transpiration by small changes in leaf resistance was clearly demonstrated.--Copyright 1973, Biological Abstracts, Inc.
W74-01734

NOTE ON THE BIOLOGY OF RICE WATER WEEVIL, LISSORHOPTRUS ORYZOPHILUS,
Texas A and M Univ., Beaumont. Agricultural Research and Extension Center.
C. C. Bowling.
Ann Entomol Soc Am, Vol 65, No 4, p 990-991, 1972, Illus.
Identifiers: Biology, Light trap, Lissorhoptrus-oryzophilus, *Reproduction, *Rice water weevil, *Weevils.

The first-stage larvae are easily intercepted after they emerge from the leaf sheath and before they enter the soil. Interception is accomplished by exposing rice plants to ovipositing adults and subsequently suspending plants containing eggs in water. The larvae emerge from the leaf sheath and drift downward through the water to the bottom of the container. Studies on the reproductive capacity of rice water weevil were conducted by intercepting first-stage larvae in 1970 and 1971. A total of 1422 larvae was recovered from the test conducted in 1970. The average larvae per female per day of exposure to the plants was 1.7. In the test conducted in 1971, a total of 784 larvae was recovered, with an average of 2.2 larvae per female per day of exposure. These data are indicative of the reproductive capacity of the rice water weevil at these particular dates only. Similar tests at later dates in 1971 with weevils collected with a light trap indicated that only a few females were reproducing.--Copyright 1973, Biological Abstracts, Inc.
W74-01744

A COMPARATIVE SAMPLE STUDY OF THE CHANGING LAND USE PATTERN ON EITHER SIDE OF SAHYADRI,
Shivaji Univ., Kolhapur (India). Dept. of Geography.
M. D. Tawade.
J Shivaji Univ, Vol 4, No 7/8, p 59-68, 1971, Illus.
Identifiers: *Agriculture planning, Climate, Fertility, *India (Sahyadri), *Land use, Leaching, Migration, Population, Rainfall, Sample, Soil.

The implications of the land use theory are evidently basic to both physical and economic planning especially in the country with development problems concerning the intensification of agricultural production. The agricultural land use of a region is directly related to the fertility of soil, geographical location, prevailing climate and relative mutual distance of fields from the core region. Sahyadri acts as a significant barrier, on either side of which the aforesaid factors vary. The leaching due to heavy rainfall and rugged topography is responsible for low fertility in Konkan, India, whereas the problem is not severe in Kolhapur region. Accordingly the human response is different. Seasonal unemployment and resultant migratory trend exists in Konkan. The higher potentiality of Kolhapur central zone absorbs the population pressure.--Copyright 1973, Biological Abstracts, Inc.
W74-01748

EFFECT OF IRRIGATION AND ALKALI TREATMENT ON THE MICROBIOLOGICAL PROCESSES IN SOIL, (IN UKRAINIAN),
Khersonskii Selskokhozyaistvennyi Institut (USSR).
K. F. Kiver.
Mikrobiol Zh (Kyyiv). Vol 34, No 4, p 489-494, 1972. (English summary).
Identifiers: *Alkali treatment (Soils), *Cabbage, Irrigation, *Microbiological process, *Soil treatment, Yield, *USSR (Ukraine).

Microbiological and enzymic activity was studied in dark chestnut soils of the southern Ukraine under late cabbage. Moistening during the vegetative irrigations by water spraying and furrow irrigation compacts soil. Deep (30-35 cm) soil loosening of interrows by means of a slot-cutter before irrigation favors a deeper penetration of moisture during irrigations and better soil aeration. Irrigation, deepening of fall plowing from 30 to 40 cm and deep loosening by means of a slot-cutter during vegetation, improving soil biological activity, favor an increase of late cabbage yield.--Copyright 1973, Biological Abstracts, Inc.
W74-01761

GROWTH PRODUCTIVITY AND EVAPOTRANSPIRATION, DEPENDING ON SOIL MOISTURE UPON IRRIGATING A PEPPER (CAPSICUM ANNUUM L.) CULTIVATION, (IN ITALIAN),
Padua Univ. (Italy). Istituto di Agronomia Generale e Coltivazioni Erbacee ed Arboree.
L. Giardini, and F. Pimpini.
Riv Agron. Vol 5, No 2/3, p 99-114, 1971. Illus. (English summary).
Identifiers: Capsicum-Annuum, *Evapotranspiration, Growth, Irrigation, Moisture, *Pepper cultivation, *Soil moisture, Transpiration, Crop production.

An investigation was carried out on 'Yolo Wonder' grown in large lysimetric cases to compare 5 tests where 25 cm of top soil were irrigated up to the following lowest levels of (%) available water: 95-100, 60, 45, 30, 15, corresponding to water tensions of 0.3-0.6-0.9-1.5-3.2 atm, respectively. A water soil surplus was almost always found in the first test. Significant differences among tests were observed as to: plant height, leaf number per plant, leaf area, horizontal plant projection, axillary buds, blossoming, setting, early ripening, average fruit weight, fruit length and width, percent dry matter, refractometric wall degree, specific weight of the wall. With the lowest level of available water at the moment of irrigation, the highest fruit yield was reached at 0.6 atm tension irrigation. Overall production, both in the aerial part and in the root stock, follows the same pattern as the fruit. The retarding effect on the vegetative part due to moisture surplus is more marked. The relation fruit dry matter/total dry matter decreased with lowered moisture availability. Dry matter percentage in the epigeic portion is much higher with greater soil tension. In order to yield 1 kilo green fruit, a minimum of 58.41 to a maximum of 76.91 water was required, and the highest values were reached by the 2 extreme tests. An estimate was also made of the evapotranspiration coefficients with reference to other parameters. Evapotranspiration values were correlated with: daily maximum temperature, daily minimum temperature, daily average temperature, relative air moisture and total radiation.--Copyright 1973, Biological Abstracts, Inc.
W74-01762

AGROCLIMATIC CRITERIA FOR DEVELOPMENT OF WHEAT RUST, (IN RUSSIAN),
L. A. Makarova.
Mikol Fitopatol. Vol 6, No 4, p 334-340, 1972. Illus.
Identifiers: *Argo climatic conditions, Rainfall, Temperature, *Wheat rust.

There were linear relations between deposits, hydrothermal conditions, and amount of rainfall, and the development of wheat rust.--Copyright 1973, Biological Abstracts, Inc.
W74-01765

NITRATE IN UNSATURATED ZONE OF AN ALLUVIAL SOIL IN RELATION TO FERTILIZER NITROGEN RATE AND IRRIGATION LEVEL,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 02G.
W74-01774

THE RELATIONSHIPS BETWEEN SOIL MOISTURE AND THE DEGREE OF STOMATA OPENING IN THE CORN DOUBLE HYBRID,
Academia R. S. R., Bucharest. Institutul de Biologie.
A. Ionescu.
Rev Biol (Lisb), Vol 7, No 3/4, p 203-213, 1971, Illus.
Identifiers: *Corn (Double hybrid), Indicators, Irrigation, *Stomata opening, *Siol moisture.

The degree of stomata opening in irrigated crops in 2 double hybrids was determined. Correlation was observed between soil moisture and available water for the plants and stomata opening. Stomatal movements may be utilized as irrigation indicators.--Copyright 1973, Biological Abstracts, Inc.
W74-01816

COST BENEFIT STUDIES OF IRRIGATION PROJECTS AND SUGGESTIONS FOR THEIR IMPROVEMENT,
Central Water and Power Commission, New Dehli (India).
K. Narayan, and G. V. Rao.
Irrigation and Power, Vol 29, No 3, p 317-326, 1972. 4 tab.

Descriptors: *Methodology, *Irrigation programs, *Economic feasibility, *Cost-benefit analysis, Economic impact, Social impact, Indirect benefits, Value, Model studies.
Identifiers: *India, Investment criteria.

The evolution of public investment decision criterion from strict economic feasibility tests to the use of benefit-cost analysis is investigated in the context of irrigation projects in India. Change from the strict economic feasibility test began with recognition of such unproductive works as those which would protect against famines. However, the project was considered unproductive if the water rates did not reflect an adequate percentage of the additional yield accruing to the farmer from irrigation. Thus, the greater benefits toward socio-economic change were ignored and the comprehensive impact of the project overlooked. Studies initiated during 1958 to isolate a more comprehensive criterion discovered the extensive direct and indirect benefits associated with five major projects and recommended the future use of benefit-cost analysis with a minimum ratio of 1.5 required to justify investment. Adoption of this new criterion resulted in the sanction of 31 projects which previously had not been found financially feasible. Critical evaluation of application of cost-benefit analysis indicated need for improvements to ensure uniform procedure and compatible results among regions and emphasized that fully qualified personnel execute the analysis. (Weaver-Wisconsin)
W74-01842

SEWAGE FARMING,
Washington Univ., St. Louis, Mo., Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 05D.
W74-01863

INFLUENCE OF OVERHEAD SPRINKLER SYSTEMS ON SPIDER MITE POPULATIONS IN NORTH COAST VINEYARDS OF CALIFORNIA,
California Univ., Albany. Div. of Biological Control.
D. N. Kinn, J. L. Joos, and R. L. Doutt.
Environ Entomol. Vol 1, No 6, p 795-796. 1972. Illus.
Identifiers: *California, Coasts, *Cotton, Populations, *Spider mites, *Sprinkler systems (Overhead), Tetranychus-Pacificus, *Vineyards.

Moisture stress was suggested as a factor predisposing cotton and grape to attack by spider mites, Tetranychus pacificus McGregor. Studies undertaken in North Coast, USA, vineyards indicate that sprinkler irrigation can be utilized in an integrated approach to spider mite control on premium wine varieties.--Copyright 1973, Biological Abstracts, Inc.
W74-01893

PEELED TOMATO YIELD AS AFFECTED BY THE SEASONAL WATER VOLUME IN FUNCTION OF THE WATERING FREQUENCY, (IN ITALIAN),
Bari Univ. (Italy). Instituto di Agronomia.
A. Caliandro.
Riv Agron. Vol 5, No 2/3, p 215-222. 1971. Illus. (English summary).
Identifiers: Seasonal, *Tomato yield, Volume, *Water frequency, Watering, *Crop yield.

Trials were repeated over a 4 yr period on silt-clay soil in southern Italy on 'S. Marzano.' Four different irrigation regimes and an unirrigated control were compared. The irrigation frequencies were determined by potential evapotranspiration (PET) calculated according to the Turc's formula. Water was distributed by furrow when cumulative PET reached values of 18.6, 24.8, 37.2 or 74.5 mm. Commercial yield of peeled tomato increased significantly by increasing irrigation frequency in 3 of the 4 yr. The highest yield, when irrigation was effective, was obtained by the highest frequency of irrigation. Culls decreased as a result of increasing irrigation frequencies. The effect of the irrigation on the yield is given by a higher number of fruits per plant and larger fruits.--Copyright 1973, Biological Abstracts, Inc.
W74-01897

OPTIMUM CONTROL OF IRRIGATION WATER APPLICATION,
Arizona Univ., Tucson. Dept. of Watershed Management.
M. M. Fogel, L. Duckstein, and C. C. Kisiel.
Paper presented at IFAC Symposium on Automatic Control of Water Resource Systems, Haifa, Israel, Sept 16-21, 1973. 16 p, 4 fig, 17 ref. OWRR B-032-ARIZ (3). 14-31-0001-3858.

Descriptors: Watershed management, *Decision making, *Optimization, Mathematical models, Stochastic processes, Simulation analysis, Systems analysis, *Soils, *Irrigation, *Crops.

The problem of controlling soil water within the root zone of irrigated crops to minimize the expected loss is examined. Control is obtained by the amount and timing of irrigations to replenish the soil water reservoir depleted by the crop's water consumption. Actual evapotranspiration rates are a function of the prevailing soil water level and the evaporative demand, which may be considered to be either deterministic or probabilistic. For crops grown on a particular soil, an optimum soil water level is defined as the lowest soil water level above which crops are not stressed. The reduced yield of a crop is related to its growth stage and to the amount and duration that the soil water content is below this optimum value. Existing inventory models are adapted for the purpose of determining the optimal irrigation policy, that is, the timing and amount of water application that result in the maximum return to the irrigation farmer. Solutions to complex decision-making problems are currently available for a variety of irrigation situations. More realistic interpretations of the physical system are the claims made for using this new approach.
W74-01973

THE EFFECTS OF THE WIND SPEED ON THE WATER ABSORPTION OF THE CUCUMBER (IN JAPANESE),
Kagawa Univ., Takamatsu (Japan). Faculty of Agriculture.
H. Miyagawa.
Kagawa Daigaku Nogakubu Gakuzyutu Kokoku. Vol 24, No 1, p 18-24. 1972. Illus. (English summary).
Identifiers: Absorption, *Cucumber, Light, Temperature, *Water absorption, *Wind speed.

The amount of water absorption by the cucumber plants at 115 cm/sec of wind speed was 478 mg/dm2.hr when the cucumber plants were exposed to 0.6 cal/cm2.min light intensity. The absorption was 625 mg/dm2.hr at 0.15 cal/cm2.min light intensity. Water absorption at upward wind speed of 37 cm/sec rapidly decreased at the light intensity of 0.6 cal/cm2.min but gradually diminished at 0.15 cal/cm2.min. The amounts of water absorbed depended not only on the light intensity but also on wind speed. The changes of the stomatal aperture of the cucumber plant leaf were also influenced by wind speed and the light intensity. The temperature of the cucumber leaf was low when large amounts of water were abosrbed. This was caused by latent heat flux from the leaf surface by transpiration.--Copyright 1973, Biological Abstracts, Inc.
W74-01983

THE INFLUENCE OF FERTILIZERS AND IRRIGATION ON GROWTH AND YIELD OF SWEET POTATO,
Punjab Agricultural Univ., Ludhiana (India).
K. S. Nandpuri, R. S. Dhillon, and S. Singh.
Indian J Hortic. Vol 28, No 2, p 139-143. 1971.
Identifiers: *Fertilizers, Growth, *Irrigation, Nitrogen, Potash, *Sweet potato, Yield, Crop yield.

As the N application was increased from 28 kg to 56 kg/ha there was a corresponding increase in the total vine growth, root size and yield. Application of potash and various irrigation intervals (I) did not affect the top growth and root development significantly. Among the various interactions, I X K affected only the root circumference. Combination of potash 34 kg with 7 days and 5 days interval and without potash with 5 days and 3 intervals were equally effective for increasing root thickness. The interaction I X N X K affected number of roots/plant and length and thickness of roots. The best combinations were N 84 kg, potash 34 kg with 3 and 7 days interval and N 84 kg without potash, with 5 days interval.--Copyright 1973, Biological Abstracts, Inc.
W74-01989

THE EFFECT OF NATURAL SHADE AND SPRAYING WITH WATER ON THE PRODUCTIVITY OF DAIRY COWS IN THE TROPICS,
Central Veterinary Lab., Dar es Salaam, (Tanzania).
J. S. MacFarlane, and B. A. Stevens.
Trop Anim Health Prod. Vol 4, No 4, p 249-253. 1972.
Identifiers: Bos-Indicus, Bos-Taurus, *Dairy cows, *Milk productivity, *Shade, *Spraying, Tropics.

The effect of natural shade provided by grazing under coconut palms, and of spraying with water 3 times/day, on the milk yield of Boron (Bos indicus) and Firesian x Boran (50% B. taurus) dairy cattle was examined. The shade treatment was held constant for any 1 cow lactation but the spraying treatment was a single-reversal with an extra period to assess carry-over effects. Shade had a very significant effect on the Friesian crosses increasing the milk yield by 18.4%, but a non-significant depressing effect on the milk yield of the Borans. The effect of spraying was non-significant on both breeds. Seasonal differences were examined and treatment effects on water and salt consumption.--Copyright 1973, Biological Abstracts, Inc.
W74-01994

PLANT-AVAILABLE AND EXTRACTABLE SULFUR IN SOME SOILS OF ENGLAND AND WALES,
Grassland Research Inst., Hurley (England). Soils Plant Nutrition Div.
For primary bibliographic entry see Field 02G.
W74-01997

EFFECTS OF PLASTIC MULCH AND ROW SPACING ON CARROT GROWN NORTH OF LATITUDE 60 DEGREE N,
Department of Agriculture, Morden (Manitoba). Research Station.
G. H. Gubbels.
Can J Plant Sci, Vol 52, No 4, p 660-661, 1972.
Identifiers: Canada, *Carrot, Daucus-carota, Moisture, *Mulch (Plastic), Row spacing, Soils, Temperature, Crop yield.

An experiment was designed to maximize water utilization by covering the entire plot with plastic in such a way that all the water would enter the soil at the base of the plant. Carrot (Daucus carota L., cv. 'Red Cored Chantenay') was used as the test crop. The treatments consisted of spaced rows with and without mulch, and paired rows with mulch. There were no differences between the spaced and paired rows except in the afternoon soil temperature in June. The soil temperatures in the mulched plots were higher than in the unmulched for the morning record in all months. A similar situation was observed with the afternoon record for all months except Sept. Soil temperature differences between mulched and unmulched plots were greatest early in the season but decreased as the days grew shorter and the foliage covered more of the surface area. There was no difference in soil-moisture content between mulched and unmulched plots, but average root weight and yield were greater in the mulched plots. The plastic mulch conserved as much water as possible and made it readily accessible to the plants. This, together with the increased soil temperature, resulted in a 45% increase in yield. Clear polyethylene can be used to increase soil temperature while making maximum use of water in northern latitudes where low soil temperature and moisture often limit plant growth.--Copyright 1973, Biological Abstracts, Inc.
W74-01999

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME I - SUMMARY,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02043

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02044

FIELD STUDIES ON HALO BLIGHT OF BEANS (PSEUDOMONAS PHASEOLICOLA) AND ITS CONTROL BY FOLIAR SPRAYS,
National Vegetable Research Station, Wellesbourne (England).
J. D. Taylor.
Ann Appl Biol, Vol 70, No 3, p 191-197. Illus.
Identifiers: *Beans, Chlorides, Copper, *Foliar sprays, Halo blight, Pseudomonas-phaseolicola, Streptomycin, Sulfates.

In 1968 when conditions were favorable for the spread of infection (rainfall 243 mm June-Aug.), halo blight of beans initiated from 0.38% primary infection produced 33.8% infected pods but in 1969 (rainfall 112 mm June-Aug. +38 mm irrigation water), similar level of primary infection resulted in only 3.2% infected pods. In both years plant and pod infection were reduced by approximately 90% by sprays of streptomycin sulfate or copper oxychloride (0.1% a.i. (active ingredient) 60 gal/acre (675 l/ha)) applied every 10 days from seedling emergence to flowering time.--Copyright 1973, Biological Abstracts, Inc.
W74-02070

PARAMETRIC MODEL OF RUNOFF IN LOW--LYING AGRICULTURAL LANDS (IN JAPANESE),
Shimane Univ., Matsue (Japan). Faculty of Agriculture.
A. Fukushima.
Bull Fac Agric Shimane Univ. 5 p 76-85. 1971, Illus. (English summary).
Identifiers: *Agricultural lowlands, *Drainage channels, Parametric models, Runoff, *Mathematical models.

The parametric model of rain water flow in the agricultural area is presented and the method of runoff analysis discussed. The mathematical model has 2 parameters which express the conveyance of drainage channel and the initial water storage in the basin. The runoff characteristics, the adaptability of the runoff model and its usefulness are described.--Copyright 1973, Biological Abstracts, Inc.
W74-02076

PRELIMINARY TRIALS WITH HERBICIDES IN IRRIGATED ONIONS AT SAMARU, NIGERIA,
Institute for Agricultural Research, Zaria (Nigeria).
J. H. Green.
Hortic Res. Vol 12, No 2, p 119-125. 1972.
Identifiers: Chloroxuron, Chlorpropham, Control, Crop, Fluorodifen, *Herbicides, Monuron, *Nigeria (Samaru), *Onions, Chlorthal dimethyl, Weeds, Yield, Irrigation.

Between 1968 and 1971, trials were undertaken to compare the effectiveness of chloroxuron, chlorpropham, chlorthal dimethyl, monuron, nitrofen and fluorodifen in an irrigated transplant onion crop in northern Nigeria. The herbicides were compared with a hoed control, and the results indicate that on the bases of yield, crop damage and number of weedings required, chlorthal dimethyl was the most effective material.--Copyright 1973, Biological Abstracts, Inc.
W74-02079

OCCURRENCE OF PHYTOPHTHORA ROOT ROT OF ALFALFA IN WASHINGTON,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
J. H. Elgin, Jr., D. W. Evans, and J. M. Kraft.
Plant Dis Rep. Vol 56, No 10, p 830-831. 1972, Illus.
Identifiers: *Alfalfa, Isolation tests, Medicago-Sativa, Pathogenicity tests, *Phytophthora-Megasperma, *Root rot, *Washington.

Chlorotic, severely stunted, 1-yr old alfalfa (Medicago sativa) plants were collected from scattered areas in a poorly drained, irrigated field near Ellensburg, Washington. Roots of many plants were rotted to within 7.5 cm of the crown. Isolates prepared from these roots were identified as Phytophthora megasperma. Two methods used in the isolation and pathogenicity tests are described.--Copyright 1973, Biological Abstracts, Inc.
W74-02080

RESPONSE OF SOYBEANS TO SUBIRRIGATION,
Agricultural Research Service, Thorsby, Ala. Soil and Water Conservation Research Div.
B. D. Doss, and R. W. Pearson.
Soil Sci. Vol 114, No 4, p 264-267. 1972, Illus.
Identifiers: *Irrigation (Subsurface), *Soybeans, Crop yield, Plant growth.

Soybeans responded to irrigation in both plant height and bean yield, but subsurface application did not prove to have any advantage over surface application. Although plants were not allowed to experience moisture stress at any time during the growth cycle in the subirrigated treatment, yields were not significantly higher than for the surface irrigated treatment, and efficiency of water use was much lower. The lower horizons of this soil are too permeable for practical use of subirrigation.--Copyright 1973, Biological Abstracts, Inc.
W74-02082

DIAGNOSTIC TECHNIQUES FOR EVALUATING IRRIGATION WATER QUALITY,
Haryana Agricultural Univ., Hissar (India). Dept. of Soils.
For primary bibliographic entry see Field 05A.
W74-02083

INFLUENCE OF ENVIRONMENT AND LEAF EXCISION ON GAS EXCHANGE OF OAT LEAVES,
Guelph Univ. (Ontario). Dept. of Crop Science.
For primary bibliographic entry see Field 02I.

W74-02084

LAND MANAGEMENT IN RED (CHALKA) SOILS OF TELENGANA,
Indian Council of Agricultural Research, Hyderabad. Southern Regional Soil Conservation Research Centre.
S. Chinnamani, and G. Singh.
Ann Arid Zone. Vol 10, No 4, p 217-224. 1971.
Identifiers: Grading, *India (Telengana), Irrigation, *Land management, *Soils (Red Chalka), Crop yield.

Implementation of modern agricultural technique coupled with cultivation of perennial grass and tree crops will improve productivity of rainfed red soil region. Adoption of soil conservation measures like graded bunding cultivation of high yielding crops, grasses and trees i.e., adoption of mixed farming, is a must in the non-irrigation red soil regions of semi-arid tracts. For dry lands grading was found useful for economy in water and obtaining high crop yield.--Copyright 1973, Biological Abstracts, Inc.
W74-02086

THE INFLUENCE OF DROUGHT ON THE COMPOSITION OF MAIZE SILAGE,
M. Von La Chevallerie, P. L. Van Biljon, P. J. Boshoff, and H. J. Van Der Merwe.
S Afr J Anim Sci. Vol 1, No 1, p 17-21. 1971, (English summary).
Identifiers: *Corn, *Drought, *Maize silage, Meal, Molasses, Urea.

Three morphological types of maize plants were used: normal plants with a good cob development, plants about 1 m high with small cobs and plants with normal vegetative growth but with thin underdeveloped cobs; 40 kg of each sample was ensiled in each of 4 plastic containers. Three additions, urea (1%), maize meal (2.5%) and molasses (2.5%) were compared with a control without any additions. Analyses were done for total N, crude fiber, ether extract, NFE (N-free extract), total soluble- and non-reducing sugars, water soluble N and ammonia N. The thin cob maize plants contained the highest total N whereas the normal plants contained the lowest. The total soluble sugar content was approximately the same for the thin cobbed and normal plants, although the small maize was slightly lower. In general the total N content of the thin cobbed and the small plants silage was higher than in the normal silage. The addition of urea resulted in a higher N content in all cases. The production of steam volatile fatty acids was not noticeably different between all silage samples. Addition of maize meal and molasses had no noticeable influence on the chemical composition of the silage except that in the case of molasses the sugar content of the silage was increased. Maize which had suffered from moisture stress could be used advantageously for making of silage.--Copyright 1973, Biological Abstracts, Inc.
W74-02089

EFFECT OF MINERAL NUTRIENTS ON THE GROWTH, DEVELOPMENT AND PRODUCTIVITY OF COTTON UNDER DIFFERENT WATER SUPPLY CONDITIONS, (IN AZERBAIYAN),
B. Z. Hysejnov, and A. N. Mamedov.
Izv Akad Nauk Az SSR Ser Biol Nauk. 5-6 p 25-27. 1971.
Identifiers: *Cotton production, Growth, Nutrients (Minerals), Water supply.

Mineral nutrients have a favorable effect in both minimum (40%) and optimum (60%) soil moisture conditions. With a minimum water supply the best growth of cotton was observed in the experimental variant N200P200K50, and at an optimal moisture content in the variant N100P200K50.--Copyright 1973, Biological Abstracts, Inc.
W74-02090

THE NEED FOR INTENSIFICATION IN ANIMAL PRODUCTION AND THE CONSEQUENT POLLUTION PROBLEM,
B.O.C.M. Silcock Ltd., Basingstoke (England).
For primary bibliographic entry see Field 05B.
W74-02092

PESTS, CROP DAMAGE AND CONTROL PRACTICES WITH IRRIGATED COTTON IN A TROPICAL ENVIRONMENT,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research.
For primary bibliographic entry see Field 05G.
W74-02093

SOIL WATER AND GROWTH OF RICE AND WEEDS,
Agricultural Research Service, Stuttgart, Ark. Crops Research Div.
R. J. Smith, and W. T. Fox.
Weed Sci. Vol 21, No 1, p 61-63. 1973.
Identifiers: Aeschynomene-Virginica, Brachiaria-Platyphylla, Echinochloa-Crus-Galli, Growth, Oryza-Sativa, *Rice, Sesbania-Exaltata, *Soil water, *Weeds.

In put culture experiments in the greenhouse, rice (Oryza sativa L. 'Nova 66'), red rice (O. sativa L.), barnyardgrass (Echinochloa crus-galli (L.) Beauv.), broadleaf signalgrass (Brachiaria playphylla (Griseb.) Nash), northern jointvetch (Aeschynomene virginica (L.) B.S.P.), and hemp sesbania (Sesbania exaltata (Raf.) Cory) were seeded 1.3, 2.5, 5.1, and 10.2 cm deep in Crowley silt loam which was held at field capacity (24% moisture), saturation (34% moisture), or submerged 1.3 or 5.1 cm. At field capacity and saturation all species seeded 1.3, 2.5 and 5.1 cm deep emerged and grew well; seeding the plants 102. cm deep reduced emergence and growth. Submergence of the soil controlled all weeds effectively but reduced emergence and growth of dry-seeded rice.--Copyright 1973, Biological Abstracts, Inc.
W74-02104

THE WET AND THE DRY: TRADITIONAL IRRIGATION IN BALI AND MOROCCO,
Institute for Advanced Study, Princeton, N.J.
For primary bibliographic entry see Field 06G.
W74-02106

PATTERN OF NEW ROOT PRODUCTION IN PEACH TREES UNDER IRRIGATION,
Victorian Dept. of Agriculture, Tatura (Australia). Horticulture Research Station.
B. Cockroft, and K. A. Olsson.
Aust J Agric Res, Vol 23, No 6, p 1021-1025, 1972, Illus.
Identifiers: *Irrigation, Patterns, *Peach trees, Rapid, *Roots, Trees, Withdrawal, *Australia (Victoria).

A seasonal pattern of new root production is described for peach trees under irrigated conditions in northern Victoria, Australia. The pattern is similar to that described elsewhere for trees growing under natural rainfall or only intermittently irrigated, most root production occurring in spring with little in summer. The low root production in summer even under frequent irrigation is associated with rapid withdrawal of water from the soil following each irrigation. Irrigation criteria are discussed, since soil water levels conventionally considered adequate for leaves and fruit may be inadequate for root production.--Copyright 1973, Biological Abstracts, Inc.
W74-02124

ENGINEERING DESIGN REPORT FOR SPRAY IRRIGATING WASTEWATER FROM THE SANITARY DISTRICT OF BEARDSTOWN AND THE OSCAR MAYER AND CO. MEAT PROCESSING PLANT.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02126

NITRATE IN SURFACE AND SUBSURFACE FLOW FROM A SMALL AGRICULTURAL WATERSHED,
Agricultural Research Service, Watkinsville, Ga.
For primary bibliographic entry see Field 05B.
W74-02150

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

THE ECONOMIC IMPACT OF BEAVER LAKE RESERVOIR: A COST BENEFIT STUDY,
Arkansas Univ., Fayetteville. Dept. of Economics.
For primary bibliographic entry see Field 06B.
W74-01652

BIOLOGICAL CONTROL OF WATER WEEDS WITH PLANT PATHOGENS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 05C.
W74-01653

ENVIRONMENTAL DISTRIBUTION AND METABOLIC FATE OF KEY INDUSTRIAL POLLUTANTS AND PESTICIDES IN A MODEL ECOSYSTEM,
Illinois Univ., Urbana. Dept. of Entomology.
For primary bibliographic entry see Field 05D.
W74-01655

METHODOLOGIES FOR FLOW PREDICTION IN URBAN STORM DRAINAGE SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-01656

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.
For primary bibliographic entry see Field 07B.
W74-01663

NATURAL VEGETATION INVENTORY,
Oregon State Univ., Corvallis. Rangeland Resources Program.
B. J. Schrumpf.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 59-66, 1973. 1 fig, 1 tab, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Vegetation, *Mapping, Surveys, Land use, Arid lands, Topography, Terrain analysis, Forest, Grasslands, Data collections, Arizona.
Identifiers: ERTS, *Vegetation identification.

Unique characteristics of ERTS imagery can be used to inventory natural vegetation. While satellite images can seldom be interpreted and identified directly in terms of vegetation types, such types can be inferred by interpretation of physical terrain features and through an understanding of the ecology of the vegetation. (See also W74-01663) (Knapp-USGS)

W74-01671

VEGETATIVE AND GEOLOGIC MAPPING OF THE WESTERN SEWARD PENINSULA, ALASKA, BASED ON ERTIS-1 IMAGERY,
Alaska Univ., College.
J. H. Anderson, L. Shapiro, and A. E. Belon.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 67-75, 1973. 3 fig, 10 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Terrain analysis, *Geological mapping, *Vegetation, Mapping, Aerial photography, Ecology, Geology, *Alaska, Data collections, Forests.
Identifiers: ERTS, *Vegetation identification.

ERTS-1 scene 1009-22095 (Western Seward Peninsula, Alaska) was studied to evaluate whether direct visual examination of individual and composite color prints can provide new information of the vegetation and geology of this relatively well known area of Alaska. The vegetation analysis reveals seven major vegetation types, only four of which are described on existing vegetation maps. In addition, the ERTS analysis provides greater detail than the existing maps on the areal distribution of vegetation types. Most of the major rock units and geomorphic boundaries shown on the available geologic maps could also be identified on the ERTS data. Several major high-angle faults were observed, but the zones of thrust faults which dominate the structure of the area are much less obvious. All of the previously mapped granitic intrusive rocks in the area were identifiable on the images; however, a radial drainage pattern about 7 km in diameter, probably indicative of a buried intrusive, was recognized for the first time on the ERTS images. (See also W74-01663) (Knapp-USGS)
W74-01672

ERTS-1 EVALUATION OF NATURAL RESOURCES MANAGEMENT APPLICATIONS IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
P. T. Tueller, and G. Lorain.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 77-85, 1973. 2 fig, 5 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Great Basin, *Mapping, Vegetation, Terrain analysis, *Nevada, Snow cover, Deserts, Arid lands, Tophgraphy, Crops, Playas, Lakes, Streams, Phreatophytes, Land use, Data collections.
Identifiers: ERTS, *Vegetation identification.

Mountains, valleys, playas, stream courses, canyons, alluvial fans, and other landforms of the Great Basin are readily delineated on ERTS-1 imagery, particularly with MSS-5. Each kind is useful for identifying and studying one or more natural resource features. For example, crested wheatgrass seedings were most easily identified and measured on MSS-7. Color enhancements were useful for depicting meadows and phreatophytic vegetation. Work is underway to inventory and monitor wildfire areas by age and successional status. Playa surfaces, water surfaces, phreatophytic vegetation, snow cover, meadows, and other features of Nevada are being inventoried. Most of this is unavailable from conventional sources and would not be available without the possibility of rapid inventory on ERTS-1 imagery. Vegetation ecotones are being delineated for vegetation mapping. The pinyon/juniper-northern desert shrub ecotone was identified with considerable success. Phenology changes can be used to describe vegetation changes. (See also W74-01663) (Knapp-USGS)

W74-01673

EVALUATION OF ERTS-1 IMAGERY IN MAPPING AND MANAGING SOIL AND RANGE RESOURCES IN THE SAND HILLS REGION OF NEBRASKA,
Nebraska Univ., Lincoln. Dept. of Agronomy.
P. M. Seevers, and J. V. Drew.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 87-89, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Grasslands, *Land use, Mapping, *Nebraska, Grazing, Crops, Great Plains, Irrigation, Data collections.
Identifiers: ERTS, *Sand Hills (Nebr).

High altitude photography of test sites in the Sand Hills of Nebraska was useful for identification of subirrigated range as well as complexes of choppy sands and sands range, which compose approximately 85% of the Sandhills rangeland. These range sites form the basic units necessary for the interpretation of range condition classes used in grazing management. Analysis of ERTS-1 imagery acquired during August, September and October, 1972 indicated potential for the identification of gross differences in forage density within given range sites identified on early season aerial photography. (See also W74-01663) (Knapp-USGS)
W74-01674

MONITORING CALIFORNIA'S FORAGE RESOURCE USING ERTS-1 AND SUPPORTING AIRCRAFT DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
D. M. Carneggie, and S. D. DeGloria.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Volume I--Technical Presentations, Sect A, National Aeronautics and Space Administration Report NASA SP-327, p 91-95, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Grasslands, *California, Data collections, Crops, Vegetation, Grazing, Land use, Land management.
Identifiers: ERTS.

NASA's Earth Resources Technology Satellite (ERTS-1) offers unique capabilities for regional monitoring of forage plant conditions. The repetitive coverage every 18 days, the synoptic view, and the real-time recovery of the imagery for immediate analysis combine to make the ERTS satellite a valuable tool for improving the evaluation of rangeland resources. Analysis of the ERTS imagery should reveal the location and size of ranges affected by favorable or unfavorable climatic variables. ERTS imagery can provide the bases for determining the location and extent of potential fire hazard. ERTS data do not provide sufficient resolution to determine the cover or condition of forage plants in most perennial range plant communities. ERTS data provide a permanent record of range conditions. A comparison of ERTS images with aircraft data obtained on previous years reveal the relative difference in range condition between years. ERTS data acquired on a year-to-year basis can provide the first and most effective means for comparing changes in range condition from year to year for large rangeland areas. (See also W74-01663) (Knapp-USGS)
W74-01675

TESTING THE USEFULNESS OF ERTS-1 IMAGERY FOR INVENTORYING WILDLAND RESOURCES IN NORTHERN CALIFORNIA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
D. T. Lauer, and P. F. Krumpe.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 97-104, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Forest, Land use, Vegetation, Data collections, California.
Identifiers: ERTS, *Vegetation identification.

The Forestry Remote Sensing Laboratory at the University of California is testing the usefulness of ERTS-1 imagery for inventorying wildland resources in northern California. Studies are being conducted in two large wildland areas, namely, the Feather River Watershed and the Northern Coastal Zone. Within the Davis Lake study area specific resource type identification could be done at a level of accuracy of 65% and broad resource type identification at 70%. Within the Bucks Lake study area, boundaries between contrasting forest types were properly mapped by image interpretation on ERTS-1 imagery. The ERTS-1 imagery yielded less detailed information than conventional aerial photographs at the Bucks Lake study area, but the image interpretation was done much more cheaply. At the San Pablo Reservoir area, a skilled image analyst could identify woody vegetation with better than 86% accuracy. (See also W74-01663) (Knapp-USGS)
W74-01676

ERTS-1 IMAGERY AND HIGH FLIGHT PHOTOGRAPHS AS AIDS TO FIRE HAZARD APPRAISAL AT THE NASA SAN PABLO RESERVOIR TEST SITE,
California Univ., Berkeley. Space Sciences Lab.
R. N. Colwell.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 145-156, 1973. 8 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Forest fires, *Hazards, *Surveys, Mapping, *California, Frost, Data collections.
Identifiers: ERTS, *Berkeley (Calif), Eucalyptus trees.

ERTS imagery when used with limited amounts of aerial photography and direct onsite observation can greatly facilitate the making of fire-hazard appraisals. Some unusual circumstances are combining to produce a condition of critical fire hazard in many parts of California. The hazard is especially great in a very hilly portion of the NASA San Pablo Reservoir Test Site, immediately east of the Oakland-Berkeley metropolitan complex. More than 8 million eucalyptus trees were planted in the Oakland-Berkeley hills along a 25-mile ridgeline. These trees can constitute a very real hazard even under normal climatic conditions and an extreme fire hazard under abnormal climatic conditions. The test site area is in the wettest rainy season in history. Consequently the wild oats and other herbaceous annuals are growing now more luxuriantly than ever before. By the summer of 1973, when such vegetation will have turned brown and become tinder dry, it probably will constitute the largest volume of flash fuels that the rangelands in this area have ever known. The coldest winter temperatures in recorded history damaged many eucalyptus trees. The tall dense eucalyptus timber stands with their tremendous crown canopies are tinder-dry foliage loaded with volatile oils. By examination of ERTS imagery it has been possible to select areas in which vegetation stress was developing to the point where a closer look with aerial photography was warranted. (See also W74-01663) (Knapp-USGS)
W74-01681

PHENOLOGY SATELLITE EXPERIMENT,
Cornell Univ., Ithaca, N.Y. Div. of Atmospheric Sciences.
B. E. Dethier, M. D. Ashley, B. Blair, and R. J. Hopp.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 157-165, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Phenology, *Forests, Surveys, Data collections, Mapping, Crops, Growth stages, Ecology, Habitats.
Identifiers: ERTS.

A phenological event (the brown wave-vegetation senescence) for forests and crops was detected using ERTS-1 imagery. Data handling techniques included computer analysis and photo interpretation procedures. Computer analysis of ERTS-1 multispectral scanner digital tapes in all bands was used to give the relative changes of spectral reflectance with time of forests and specified crops. These data were obtained for a number of the study's 24 sites located within four north-south corridors across the United States. The recession of vegetation development can be detected very well. Specific phenological events such as crop maturity or leaf fall can be mapped for specific sites and possibly for entire regions. Preliminary analysis based on a number of samples in mixed deciduous hardwood stands indicate that as senescence proceeds, both the rate of change and differences in color among species can be detected. This will permit timber surveys by species over large areas and the determination of conditions of wildlife habitats. (See also W74-01663) (Knapp-USGS)
W74-01682

FOREST AND RANGE MAPPING IN THE HOUSTON AREA WITH ERTS-1 DATA,
Lockheed Electronics Co., Inc., Houston, Tex. Houston Aerospace Systems Div.
G. R. Heath, and H. D. Parker.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 167-169, 1973. 6 fig, 1 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Forests, *Mapping, *Grazing, Marshes, Grasses, Surveys, Data collections, *Texas.
Identifiers: ERTS, *Vegetation identification, Spartina.

ERTS-1 data acquired over the Houston area were analyzed for applications to forest and range mapping. The Sam Houston National Forest (Texas) was chosen as a test site. Conventional imagery interpretation as well as computer processing methods were used to make classification maps of timber species, condition and land use. The results were compared with timber stand maps which were obtained from aircraft imagery and checked in the field. Conventional interpretation techniques indicated an accuracy in classification of 63%. The computer-aided interpretations made by a clustering technique gave 70% accuracy. Computer-aided and conventional multispectral analysis techniques were applied to range vegetation type mapping in the gulf coast marsh. Two species of salt marsh grasses were mapped. Marshhay cordgrass and gulf cordgrass mark a change in elevation as small as three inches above sea level. The two types are separable in ERTS-1 MSS data, both manually and automatically. (See also W74-01633) (Knapp-USGS)
W74-01683

EVALUATION OF ERTS-1 IMAGERY FOR GEOLOGICAL SENSING OVER THE DIVERSE

GEOLOGICAL TERRANES OF NEW YORK STATE,
Geological Survey, Albany, N.Y.; and New York State Museum and Science Service, Albany.
For primary bibliographic entry see Field 07C.
W74-01690

GEOLOGY OF UTAH AND NEVADA BY ERTS--1 IMAGERY,
Utah Univ., Salt Lake City. Dept. of Geological and Geophysical Sciences.
For primary bibliographic entry see Field 07C.
W74-01692

PRELIMINARY GEOLOGIC APPLICATION OF ERTS-1 IMAGERY IN ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 07C.
W74-01693

A COMPARISON OF GEMINI AND ERTS IMAGERY OBTAINED OVER SOUTHERN MOROCCO,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01694

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA, AND AUSTRALIA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01697

MAPPING QUATERNARY LANDFORMS AND DEPOSITS IN THE MIDWEST AND GREAT PLAINS BY MEANS OF ERTS-1 MULTISPECTRAL IMAGERY,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01702

PRELIMINARY GEOLOGIC INVESTIGATIONS IN THE COLORADO PLATEAU USING ENHANCED ERTS IMAGES,
Jet Propulsion Lab., Pasadena, Calif.
For primary bibliographic entry see Field 07C.
W74-01708

ERTS APPLICATIONS IN EARTHQUAKE RESEARCH AND MINERAL EXPLORATION IN CALIFORNIA,
Rockwell International Corp., Thousand Oaks, Calif. Science Center.
For primary bibliographic entry see Field 07C.
W74-01711

SOME ASPECTS OF ACTIVE TECTONISM IN ALASKA AS SEEN ON ERTS-1 IMAGERY,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 07C.
W74-01712

WATER MANAGEMENT USING SUBSURFACE DRAINS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01717

REDUCING SEEPAGE FROM STOCK TANKS WITH UNCOMPACTED, SODIUM-TREATED SOILS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
R. J. Reginato, F. S. Nakayama, and J. B. Miller.
Journal of Soil and Water Conservation, Vol 28, No 5, p 214-215, September - October 1973. 3 ref.

Descriptors: *Seepage, *Seepage control, *Soil treatment, Soil sealants, Sodium, Soil water movement, Ion exchange, *Carbonates.

Seepage from many stock tanks in calcium-aggregated soils can be greatly reduced by treating the soil with sodium carbonate without compaction. The proper amount of sodium carbonate (determined by soil analysis) is broadcast on the soil and mixed into the top 3 to 5 inches. Seepage losses were reduced from 5 inches a day to 0.15 inch a day in field tests. (Knapp-USGS)
W74-01718

SOME FEATURES OF THE HYDROLOGIC REGIMEN OF SARATOV RESERVOIR (NEKOTORYYE CHERTY GIDROLOGICHESKOGO REZHIMA SARATOVSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
Yu. I. Gorin.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 193-198, Leningrad, 1972. 3 fig, 3 tab, 2 ref.

Descriptors: *Reservoirs, *Reservoir construction, *Regimen, *Hydrologic cycle, Water balance, Inflow, Discharge (water), Runoff, Water levels, Water level fluctuations, Flow, Temperature, Hydroelectric plants, Water works, Seasonal.
Identifiers: *USSR (Saratov Reservoir), Volga River.

Investigations were carried out in 1965-70 to study changes in hydrologic characteristics of the Volga in the Tol 'yatti-Balakovo reach following construction of the Kuybyshev and later the Saratov waterworks. Filling of the Saratov Reservoir caused significant changes in the hydrologic regimen of the Volga in the Tol 'yatti-Balakovo reach. On the basis of water-level fluctuations, flow-velocity distribution, and temperature, the Saratov Reservoir can be divided into 2 reaches (lake-river and lake) and, on the basis of morphometric parameters, into the Kuybyshev, Syzran', Khvalynsk, and Balakovo pools. (See also W74-01723) (Josefson-USGS)
W74-01728

ACREAGE INCREASE DUE TO SLOPE,
Soil Conservation Service, Portland, Oreg.
E. W. Anderson.
J Range Manage, Vol 25, No 4, p 316-317, 1972.
Identifiers: Acreage increase, Animals, Damage, Grazing, *Management, *Resource planning, *Slopes (Steep sites).

It is imperative in resource planning and management of very steep areas to fully consider and provide for stability of the resource. Some very steep sites remain stable under judicious grazing use. Others are affected detrimentally merely by having animals walk across them.--Copyright 1973, Biological Abstracts, Inc.
W74-01746

EFFECTS OF IRRIGATION ON THE PRODUCTION AND YIELDS OF SPECIALIZED POPLAR GROVES ON A TREE FARM IN THE PIEDMONT PLAINS, (IN ITALIAN),
Instituto di Sperimentazione per la Pioppicoltura, Casale Monferrato (Italy).
M. Prevosto.
Cellul Carta. Vol 23, No 4, p 3-22, 1972. Illus. (English summary).
Identifiers: Irrigation, *Italy (Piedmont plains), Marsonnina-Brunnea, Piedmont, Plains, *Poplar, Production, Tree farms, Parasites, Yields.

To estimate the effects of irrigation on stands having different spacings, an investigation was started in 1963 on a poplar plantation of the clone I-214 established in 1959, having spacings of 3 x 3 m, 4 x 4 m, 5 x 5 m, and 6 x 6 m, which had received 2 irrigations/yr to the 4th yr of 1200 m3/ha each. The tested treatments were: AO, no irrigation; A2, 2 irrigations/yr of 1200 m3 each, supplied during May and July; A4, 4 irrigations/yr of 1200 m3 each, supplied during May, June, July and Aug. The test was complicated by the fungus interference of Marssonina brunnea. Attempts were made to estimate the importance of this parasite by comparing the results with others in similar poplar plantations of the same farm, felled before its appearance. In the absence of the parasite the lack of irrigation shortened the period of the greatest volume-production at the wider spacings, reducing annual wood production from 14-15% to 20-25% according to the spacing. There were no significant differences in wood production between 2 or 4 irrigations/yr. The cessation of irrigations from the 5th year and the presence of M. brunnea reduced the average annual increments 5-9% at the narrower spacings and 15-20% at the wider ones. In irrigated plantations infected by Marssonina, the parasite did not modify the duration of the period of the greatest volume production at any spacing as compared to the noninfected ones. In some cases, the cessation of irrigation as well as the disease attacks had less serious consequences in the denser stands.--Copyright 1973, Biological Abstracts, Inc.
W74-01755

CLIMATE AND GRASSLANDS IN SOUTH AMERICA, (IN SPANISH),
For primary bibliographic entry see Field 02B.
W74-01781

FLOOD MITIGATION VERSUS POPLAR GROWING AS ALTERNATIVE PUBLIC INVESTMENTS: A CASE STUDY,
For primary bibliographic entry see Field 06B.
W74-01832

ENVIRONMENTAL SURVEY OF THE TETON RIVER AND HENRY'S FORK OF THE SNAKE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
K. E. Holte, B. L. Keller, S. H. Merriam, G. W. Minshall, and M. G. Pavesic.
Technical completion report WRRI Code No USCE 44-418, December 1972. 271 p, 31 fig, 46 tab, 70 ref, 7 append. USCE DACW 68-72-C-0210.

Descriptors: *Water resources development, *Watersheds (Basins), *Environmental effects, *Water utilization, Idaho, Irrigation, Water management (Applied), Streamflow, Groundwater recharge, Water injury, Land use, Lumbering, Recreation, Agriculture, Grazing, Flood control, Human population, Archaeology, Tourism, Economic impact, Income, Competing uses, Comprehensive planning, Erosion control, Vegetation, Birds, Mammals, Wildlife, Habitats, Reptiles, Amphibians, Fish, Regional economics.
Identifiers: *Snake River Basin (Idaho), Demography, Ethnography.

Selected environmental factors related to the water resources in the watershed drained by the Henry's Fork and Teton Rivers and their tributaries were inventoried using the following methods: An investigative overflight, on-the-ground visitations, interviews with area professionals and laymen, and a search of literature. The effects of various forms of water development, utilization, or management upon the related environmental conditions were considered. The evaluations are summarized in a list of recommendations concerning future water resources development. Specifically, no further development should occur without intensive investigations weighing all consequences of such development. An economic evaluation of current and possible future activities of humans, fauna and flora of Fremont, Madison, and Teton Counties, Idaho is presented in the appendix. (Weaver-Wisconsin)
W74-01839

REPORT ON THE HARVARD PROGRAM OF RESEARCH IN WATER RESOURCES DEVELOPMENT,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 06B.
W74-01846

OPEN SPACE: PRELIMINARY PLAN.
Los Angeles Dept. of City Planning, Calif.
For primary bibliographic entry see Field 06G.
W74-01849

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.
For primary bibliographic entry see Field 06F.
W74-01850

REGULATING FLOOD-PLAIN DEVELOPMENT,
Chicago Univ., Ill. Dept. of Geography.
For primary bibliographic entry see Field 06F.
W74-01851

MISSISSIPPI/MINNEAPOLIS-A PLAN AND PROGRAM FOR RIVERFRONT DEVELOPMENT.
Riverfront Planning Team of Minneapolis Planning and Development, Minn.
For primary bibliographic entry see Field 03D.
W74-01855

NORTH CAROLINA WATER PLAN--PROGRESS REPORT, CHAPTER 26--BROAD RIVER BASIN--VOL. I.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Eater and Air Resources.
For primary bibliographic entry see Field 06B.
W74-01858

NORTH CAROLINA WATER PLAN-PROGRESS REPORT: CHAPTER 44, THE APPALACHIAN REGION IN NORTH CAROLINA.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01859

NORTH CAROLINA WATER PLAN-PROGRESS REPORT CHAPTER 25, THE CONCEPT OF BASIN AND REGION REPORTS IN THE NORTH CAROLINA WATER PLAN.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01860

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, PRIORITIES FOR THE RIVERBANKS PLAN.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01871

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, RECREATION, OPEN SPACES, RIVERBANKS.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01872

FLOOD PLAIN INFORMATION, RABBIT CREEK, ANCHORAGE, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 06F.
W74-01873

ANALYSIS OF COAL REFUSE DAM FAILURE, MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA--VOLUME 2, APPENDICES.
Wahler (W.A.) and Associates, Palo Alto, Calif.
For primary bibliographic entry see Field 08A.
W74-01939

MATHEMATICAL SIMULATION OF SALINITY IN THE SACRAMENTO ROVER SYSTEM,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 05B.
W74-01944

FLOOD CONTROL PROJECT MAINTENANCE AND REPAIR -- 1971 INSPECTION REPORT,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 08D.
W74-01945

FLOOD PLAIN INFORMATION, KENAI RIVER, PHASE I, KENAI PENINSULA BOROUGH, ALASKA.
Army Engineer District, Anchorage, Alaska.

Prepared for the Kenai Peninsula Borough Report, June 1973. 26 p, 12 fig, 20 plate, 2 tab.

Descriptors: *Flood data, *Flood plains, *Alaska, *Flood forecasting, Flood profiles, Aerial photography, Topography, Floods, Streamflow, Flow rates, Peak discharge, Flood damage, Ice jams, Ice breakup, Snowmelt.
Identifiers: *Kenai Peninsula Borough (Alaska), Intermediate Regional Flood, Standard Project Flood.

The portion of the Kenai Peninsula Borough, Alaska, covered by this report is subject to flooding from the Kenai River. The properties along this stream are primarily residential and recreational and were moderately damaged by the floods of 1964 and 1969. The areas in the flood plain which are now under pressure for future development are extensive. Although large floods have occurred in the past, studies indicate that even larger floods are possible. During the Intermediate Regional and Standard Project Floods, average velocities of main-channel flow is about 7.5 and 9 feet per second, respectively. Velocities of this magnitude are sufficient to cause severe erosion to banks, move structures off their foundations, transport vehicles, and cause similar damages. Overbank flow would average 1 fps. In the case of an ice jam flood, flood waters will generally rise rapidly and recede rapidly when the ice jam breaks. The levels that the Intermediate Regional Flood and Standard Project Flood are expected to reach at various locations in the area are indicated on photographs. (Woodard-USGS)
W74-01952

INTERNATIONAL SYMPOSIUM ON HYDROLOGY OF WATERLOGGED AREAS (MEZHDUNARODNYY SIMPOZIUM PO GIDROLOGII ZABOLOCHENNYKH TERRITORIY),
For primary bibliographic entry see Field 02G.
W74-01963

SE AND CONSERVATION OF WATER ESOURCES IN LITHUANIA (ISPOL'-OVANIYE I OKHRANA VODNYKH RESUR-OV LITOVSKOY SSR),
or primary bibliographic entry see Field 04B.
74-01970

MPLIFIED APPARATUS FOR DETERMIN-G LEAF WATER POTENTIALS IN PINE EEDLES,
ew Zealand Forest Service, Rotorua.
or primary bibliographic entry see Field 02I.
74-02075

RCEUTHOBIUM PUSILLUM: MOISTURE EQUIREMENTS FOR GERMINATION AND ADICLE GROWTH,
aritimes Forest Research Center, Fredericton ew Brunswick).
r primary bibliographic entry see Field 02I.
74-02088

RTHER STUDIES ON THE HYDROGRAPHY ND CHEMISTRY OF LAKE MANZALAH,
exandria Inst. of Oceanography and Fisheries gypt).
r primary bibliographic entry see Field 02H.
74-02096

PTIMAL ALLOCATION OF WATER ESOURCES IN UTAH,
ah Water Research Lab., Logan.
G. Clyde, and A. B. King.
urnal of the Hydraulics Division, American ciety of Civil Engineering, Vol 99, No HY10, oceedings paper No. 10088, p 1777-1794, Oc-ber 1973. 9 fig, 4 tab, 7 ref. OWRR B-027-UTAH

escriptors: Water supply development, *Water mand, *Utah, *Water allocation (Policy), inear programming, Optimization, Economics, ater transfer, Groundwater, Water require-ents, Water management (Applied), Constraints, mputer programs, State governments, anning, Systems analysis, Mathematical models, olorado River basin, Alternative planning.
entifiers: *Cost minimization, Simplex method, atewide water systems, Shadow prices, Cost ntrol, Sensitivity analysis, Parametric analysis.

athematical analysis of complex water resource stems is extended to a statewide system. A mber of alternative patterns and levels of de-and for water are postulated for ten intercon-cted hydrologic study areas in the state of Utah. e costs of meeting the projected demands are nimized utilizing a linear programming model of e economic-hydrologic-physical system. The mprehensive model considers virtually all uses, eas, sources, transfers, and costs of water; it has 4 constraints and 338 variables and is solved by e simplex method. Results show that the optimal st-cost system consists of the various combina-ns of groundwater, surface water, and interre-onal transfer activities which minimize the cost. so included in the results are: Shadow prices of e resources; sensitivity analyses to identify the itical cost coefficients in the optimal solution; rametric analyses to test the effects of changing nstraints; and manipulations of the model to test erating rules, legal policies, political factors, in-tutional limitations, etc. Flow diagrams and aphs summarize the important information. The ethod developed in this study allows considera-on of the full cost structure, rather than just part the development costs. (Bell-Cornell)
74-02117

REGIONAL LAND USE PLAN, 1973, FOR HANCOCK, HARRISON, PEARL RIVER, JACKSON COUNTIES, MISSISSIPPI.
Gulf Regional Planning Commission, Gulfport, Miss.

May 15, 1973. 65 p, 8 fig, 2 tab, 50 ref, 1 append. ●;S-04-25-1001.

Descriptors: *Regional development, *Marsh management, *Tidal marshes, *Land use, *Gulf coastal plain, Comprehensive planning, Future planning (Projected), *Mississippi, Urbanization, Forecasting, Long-term planning, Land development, Land resources.

The Gulf Regional Planning Commission, located in southeastern Mississippi, has developed a land use plan to help guide future development. The plan is designed to: (1) encourage planned new communities, (2) control pollution, (3) establish permanent open spaces on a regional basis, (4) preserve historic sites and other significant structures and places, (5) conserve natural resources, (6) provide for diversified growth, and (7) provide an adequate environment for all people. A land use survey was performed by canvassing the entire study area to determine existing structures and land use. This information was then transferred to maps and coded with particular attention being given to the tidal marsh areas. A master land use plan was then prepared for each county. Land use classifications include: (1) residential, (2) commercial, (3) industrial, (4) public, (5) rights-of-way, (6) NASA and military, and (7) water and unclassified. In all cases, large areas have been classified for agriculture, forestry, and resource conservation. This will help insure the preservation of such areas in conjunction with future development. (Poertner)
W74-02120

FLOOD PLAIN INFORMATION, PASCAGOULA-GAUTIER COASTAL AREAS, JACKSON COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.

Prepared for the Gulf Regional Planning Commission, Gulfport, Mississippi, June 1970. 46 p, 22 fig, 4 tab.

Descriptors: *Hurricanes, *Maximum probable flood, *Coastal plains, *Data collections, *Tidal waters, *Mississippi, Standard project flood, Land use, Flood plains, Flood profiles, Flood damage, Flood forecasting, Flood data, Flood peak, Flood frequency, Flood stanges.
Identifiers: *Jackson County (Mississippi).

The Pascagoula-Gautier coastal area in eastern Mississippi has experienced severe flooding problems from tidal floods. Without presenting any solutions, this report studies past flood characteristics, their extent and probable future floods. Future floods are classified into two areas of concern: the intermediate regional tidal flood, which has a recurrence interval of about 100 years, and the standard project tidal flood which has an extremely rare occurrence interval. The latter can be used to establish upper limits for practical flood control. The area covered in the study includes the City of Pascagoula and is rectangular in shape, extending 19 miles in an east-west direction and 6 miles north-south. The major cause of flooding is from hurricane tides or severe southerly storm tides. The most severe flood known to have occurred happened on August 17, 1969 during Hurricane Camille when damage in Jackson County total about $50 million and high water reached a level of 12.7 feet above mean sea level. The hurricane season lasts from June to November. The most severe storms usually occur in August and September. Damage is often due to relatively short-lived flooding accompanied by high water velocities. At the present time, there are no federal flood control structures in the area and none are planned. (Poertner)
W74-02121

WATER IN MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
B. E. Ellison.
Mississippi Board of Water Commissioners, Jackson, 1971. 47 p, 47 fig.

Descriptors: *Water users, *Education, *Mississippi, *Water utilization, Hydrology, Water demand, Water supply, Planning, Water resources development, Water pollution, Flooding, Water table, Water chemistry, Flood damage, Water requirements.

This booklet was prepared to meet the needs of children in junior high school and lower grades to understand some of the elementary facts of water use and supply. The importance of water to all sectors of society--municipalities, industry and agriculture--is explained. Listings are included of the quantities of water used and descriptions are given of water use and usage. The chemistry and hydrologic cycle of water are described. Besides the beneficial uses of water, the destructiveness of floods and pollution are outlined. The use of water by the Indians and early settlers is given along with the probable future requirements for water. The booklet is freely illustrated to add interest to the subject matter. (Poertner)
W74-02122

FLOOD PROTECTION FOR MISSOURI BOTTOMS.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for Business and Industrial Development Commission, St. Louis County, Missouri, May 12, 1967. 53 p, 17 fig.

Descriptors: *Flood protection, *Missouri River, *Land development, Land use, *Future planning (Projected), *Missouri, Census, Forecasting, Cost-benefit analysis, Feasibility studies, Levees, Industrial plants, Urbanization.
Identifiers: *St. Louis County (Missouri), Future growth, Industrial expansion, Corps of Engineers.

Rapid industrialization in St. Louis County, Missouri has used up much of the available good industrial land. It was estimated that by the end of 1973 there would be a severe shortage of land for industrial development. The search for suitable land includes the investigation of Missouri River bottom land for this purpose. A prime consideration in the use of this land is flood protection. The Corps of Engineers has tentative plans which include the construction of two levees that would provide an additional 22,000 acres of industrial land. Investigation showed that the total local cost for constructing the levees would be about $3 million, making this land an attractive prospect. Sponsorship of the projects is recommended, with the present Monarch-Chesterfield Levee District assuming the administrative role. Construction of the levees will also include the construction of drainage control facilities for the area and regulation of discharges on the Missouri River. The design height for the levees will be based on the controlled river discharge for the 100-year river flow plus an additional 6 feet and a 3-foot freeboard for protection against wave action. This height is estimated to be equivalent to protection for a 700 to 800-year river level and should provide adequate protection for all types of industry. (Poertner)
W74-02128

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.

October 1969. 51 p, 6 fig, 3 tab, 58 ref, 5 append.

Descriptors: *Flood control, *Non-structural alternatives, *Flood protection, Flood plains, *North Carolina, Watershed management, Flood damage, Erosion control, Floodproofing, Legislation, Building codes.
Identifiers: *Forsyth County (NC), *Winston-Salem (NC).

Forsyth County, located in northwestern North Carolina, has no major rivers nor catastrophic floods; but flooding is a problem of major concern. The hazard of flooding is growing in the county as more areas are being urbanized. The urbanization increases the amount of impervious area, thereby increasing the volume of flood water that must be handled. During construction periods the denuded soil is often eroded, causing reductions in channel capacity due to sedimentation. Only a few preventive measures have been taken to reduce the hazards of flooding, such as flood plain zoning in some areas, dredging of various stream beds, installation of artificial drainage ditches, and promotion of methods of conservation. But some areas--notably the City of Winston-Salem--need to establish additional corrective and preventive measures such as flood plain ordinances and floodproofing codes. Additional studies are recommended to supplement those already compiled, or now in effect. Both direct and indirect benefits will accrue to the public from programs to reduce flood hazards. (Poertner)
W74-02129

WATER SUPPLY AND SEWERAGE SERVICES: TOOLS FOR AFFECTING THE QUALITY OF LIFE IN FORSYTH COUNTY, N.C., VOLUME D IN THE LAND POTENTIALS SERIES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02130

UNITARY WATER SUPPLY AND SEWERAGE SERVICES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02131

4B. Groundwater Management

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-01714

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
T. G. Newport.
Pennsylvania Geological Survey Bulletin W32, 1973. 42 p, 6 fig, 1 plate, 7 tab, 9 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water wells, *Water quality, *Pennsylvania, Hydrologic cycle, Hydrogeology, Water yield, Petrology, Land use, Human population, Water pollution sources, Acid mine water, Coal mines.

The geologic formations in Clarion County, Pennsylvania, range from the Mississippian Pocono Group to Quaternary alluvium along some of the major streams. Data from more than 70 wells drilled in the county indicate that the highest groundwater yields are obtained from aquifers in the Pocono Group and in the alluvium deposits. Water in the sandstone and limestone aquifers of the consolidated rocks occurs in pore spaces and in secondary openings such as fractures and solution channels. Yields from sandstone in the Pocono Group vary widely, depending on the amount of shale interbedded. Yields of less than 50 gpm to over 500 gpm have been reported. In the Pottsville Group, the average yield is 28 gpm, but if the wells penetrate both the upper and lower sandstone members, the yield may be much higher. The sandstone and limestone members of the Allegheny Group are reliable sources of small to moderate amounts of groundwater and will yield adequate amounts for domestic use at almost any location drilled. Excessive iron is the main water quality problem in groundwater of Clarion County. Groundwater in the deeper aquifers is generally highly mineralized. In some areas, acid water from coal mines has drained into aquifers. (Woodward-USGS)
W74-01721

THE INFLUENCE OF A CHEMICAL PLANT SEWAGE SEDIMENTATION CATCHPIT ON GROUNDWATERS OF THE UPPER VISTULA FLOODPLAIN,
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
For primary bibliographic entry see Field 05B.
W74-01754

GEOLOGY OF MERCER AND OLIVER COUNTIES, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
C. G. Carlson.
North Dakota Geological Survey Bulletin 56, Part I, and North Dakota State Water Commission County Groundwater Studies 15, Part I, 1973. 72 p, 23 fig, 4 plate, 3 tab, 34 ref, 2 append.

Descriptors: *Geology, *Groundwater resources, *Hydrogeology, *Geological surveys, *North Dakota, Geologic mapping, Aquifers, Geologic formations.
Identifiers: Mercer and Oliver Counties (N Dak).

The geology of Mercer and Oliver Counties, an area of 1,817 square miles located in west-central North Dakota, as described. The primary purposes of this study are: (1) to provide a geologic map of the area, (2) to interpret the geologic history of the area, (3) to locate and define aquifers, and (4) to determine the location and extent of other natural resources in these counties. Groundwater is obtained from both glacial drift and bedrock aquifers with most of the water obtained from bedrock. Lignite beds and sands in the Sentinel Butte and Tongue River Formations provide shallow bedrock aquifers in most areas. Sandstones near the base of the Tongue River Formation and within the Hell Creek and Fox Hills Formation provide deeper artesian aquifers in many areas. Glacial drift is generally too thin or impermeable to provide good aquifers in the upland areas. However, in the valleys of the major streams and in the diversion channels, the glacial and alluvial fill may provide adequate supplies of groundwater. (Woodard-USGS)
W74-01887

BIOLOGICAL INCRUSTATION OF WELLS DUE TO MASS DEVELOPMENT OF IRON AND MANGANESE BACTERIA,
Bundesgesundheitsamt, Berlin (West Germany). Institut fuer Wasser-, Boden-, und Lufthygiene.
For primary bibliographic entry see Field 05B.
W74-01902

BIBLIOGRAPHY AND INDEX OF OKLAHOMA GEOLOGY--1972,
Geological Survey, Norman, Okla.
For primary bibliographic entry see Field 02F.
W74-01916

THAT SINKING FEELING,
National Oceanic and Atmospheric Administration, Washington, D.C.
For primary bibliographic entry see Field 02F.
W74-01920

WATER RESOURCES OF THE RUSTON AREA, LOUISIANA,
Geological Survey, Baton Rouge, La.
T. H. Sanford, Jr.
Louisiana Department of Public Works Water Resources Technical Report No 8, 1973. 33 p, 7 fig, 1 plate, 8 tab, 14 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Hydrologic data, *Louisiana, Water wells, Aquifer characteristics, Water yield, Drawdown, Water levels, Hydrogeology, Water quality, Water supply, Lakes, Water treatment.
Identifiers: *Ruston area (La).

Groundwater, the present source of water supply in the Ruston, Louisiana, area is adequate to meet the present and projected needs through the year 2000, despite the proposed large increase in groundwater use at nearby Hodge. The principal aquifer, the Sparta Sand, is the only aquifer capable of yielding large quantities of freshwater in this area. The water level at Ruston has declined 175 feet since 1920; most of this decline is attributed to industrial pumpage at El Dorado, Ark., and at Monroe, Bastrop, and Hodge, La. Aquifer dewatering, which began in the mid-1960's, will increase the yield from storage manyfold, and thus the rate of water-level drawdown will decrease significantly. The quality of water from the Sparta is generally good, but treatment is required for a 'red water' problem believed to be caused by a combination of slightly corrosive water and iron bacteria in the water system. As an alternative or complementary source, Bayou D'Arbonne Lake, 15 miles northeast of Ruston, can supply water of good quality. The lake has a capacity of 130,000 acre-feet (42.2 billion gallons) and can supply about 200 million gallons per day of water. (Woodard-USGS)
W74-01921

GEOLOGY OF BURKE COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-01923

INVESTIGATION OF RELIEF WELLS, MISSISSIPPI RIVER LEVEES, ALTON TO GALE, ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
R. L. Montgomery.
Available from NTIS, Springfield, Va. 22151 AD-757 395, Price $3.00 printed copy; $1.45 microfiche. Miscellaneous Paper S-72-21, June 1972. 110 p, 49 plate, 11 tab, 13 ref.

Descriptors: *Water wells, *Well data, *Water quality, *Levees, *Mississippi River, *Illinois, Pumping, Water yield, Investigations, Methodology, Borehole cameras, Water analysis, Chemical analysis, Hydrologic data, Evaluation.
Identifiers: *Well deterioration, Relief wells.

Pumping tests, chemical and biological analyses of water samples, and well screen inspection by means of a borehole TV camera were conducted in 1969 as part of a study of the efficiency of the relief well system along the Mississippi River between Alton and Gale, Illinois. The purposes are to determine the extent and causes of well deterioration and to investigate methods for improving and maintaining the efficiency of the well system. The relief wells were designed by personnel of the U.S. Army Engineer Waterways Experiment Sta-

on and built under the supervision of the U.S. rmy Engineer District, St. Louis (SLD). The ells were installed between 1953 and 1955. Since ien, SLD has performed a series of well pumping sts, periodically inspected the relief well system, id observed the operation of the wells during gh river stages of the Mississippi River. Pumping sts indicated that the efficiency of the wells was ecreasing at a rapid rate. Results of the 1969 mping tests indicated that the average corrected ecific yields for 24 test/wells had decreased 33% nce installation. All but one of the test wells had xperienced reduction in specific yield. The lar-st reduction amounted to 56% of the initial ecific yield. The rate of sand infiltration during mping of four wells and the amount of sediment each test well before and after pumping in-cated that the wells were stable with respect to filtration of the aquifer sands through the filter id well screen. Chemical and biological analyses i well water samples indicated high carbonate rdness and dissolved iron and the presence of on- and sulfate-producing bacteria. (Woodard-SGS)
74-01942

HEORETICAL ANALYSIS OF FORCED CON-ECTIVE HEAT TRANSFER IN REGIONAL ROUND-WATER FLOW,
inois Univ., Urbana. Dept. of Geology.
or primary bibliographic entry see Field 02F.
74-01957

EOLOGIC FACTORS AFFECTING COMPAC-ION OF DEPOSITS IN A LAND-SUBSIDENCE REA,
rizona Univ., Tucson. Dept. of Geosciences.
. B. Bull.
eological Society of America Bulletin, Vol 84, o 12, p 3783-3802, December 1973. 16 fig, 2 tab, ref.

escriptors: *Land subsidence, *Withdrawal, Compaction, *California, Water levels, Draw-own, Clays, Irrigation water, Water wells.
entifiers: *San Joaquin Valley (Calif).

the west-central San Joaquin Valley, California, mping of groundwater has changed water levels, ereby increasing the stresses that tend to com-act alluvium by as much as 50% and creating a rge area of intense land subsidence. The esti-ated (1943-1960) specific unit compaction of the eposits in a northern subarea is four times that of southern subarea, which suggests marked dif-rences in the compressibility of the deposits. wo-thirds of the compressibility difference is ly apparent and is attributed to different water-xpulsion rates in the clayey beds of different epositional environments. In the northern sub-ea, the deposits are mainly flood-plain sediments at contain extensive sand beds and thin clayey eds that are dewatered relatively quickly under creasing effective stress. In the southern sub-ea, the sediments are mainly alluvial-fan eposits that contain thick clayey sequences ad-cent to lensing sandy beds. These deposits are ewatered more slowly than those in the northern ubarea. (Knapp-USGS)
74-01958

RESH GROUNDWATER YIELD IN THE USSR ND PROSPECTS FOR ITS USE (OB KSPLUATATSIONNYKH RESURSAKH RESNYKH PODZEMNYKH VOD SSSR I PER-PEKTIVAKH IKH ISPOL'ZOVANIYA),
. N. Bindeman.
odnyye Resursy, No 3, p 112-124, 1972.

escriptors: *Groundwater, *Freshwater, *Water eld, *Water utilization, Groundwater resources, roundwater basins, Artesian aquifers, Water ells, Water supply, Water storage, Water de-and, Potable water, Irrigation.
dentifiers: *USSR.

Groundwater yield in the USSR as a whole considerably exceeds the country's demand for potable water. Excluding sparsely settled regions of Siberia and the Soviet Far East, the yield of fresh and slightly brackish groundwater for about one-half of the USSR is estimated at 6,000 to 7,000 cu m/sec or about 2,500-3,000 liters/day per capita. The supply of groundwater is greatest in intermontane artesian basins and piedmont diluvial deposits, where groundwater yield reaches 5-10 liters/sec/ sq km or more Ararat Valley, Chu and Issyk-Kul' basins, Kuba-Khachmas Depression, the intermontane depressions of northern and southern Tien Shan, and the Fergana Valley). Groundwater yield varies between 1 and 3 liters/sec/sq km in large artesian basins of the platform type (Moscow, Baltic, Polish-Lithuanian, and Dnieper-Donets artesian basins of European Russia). groundwater yield is 0.5-1.0 liter/sec/sq km or less in artesian basins of the southern Ukraine and is 0.1-0.5 liter/sec/sq km for the Ukrainian crystalline massif, the Stavropol' plateau, and Permian deposits on the eastern Russian Plain. Groundwater yield of less than 0.1 liter/sec/sq km is confined to the Donets Ridge, the Kalmyk Steppe, West Kazakhstan and adjoining regions of the Southern Urals and West Siberia, Central Kazakhstan, and a number of other regions in arid and semiarid zones. Basic directions and trends in the use of groundwater for water supply and irrigation are discussed, and measures are outlined for further satisfying the potable-water demands of the country. (Josefson-USGS)
W74-01965

USE AND CONSERVATION OF WATER RESOURCES IN LITHUANIA (ISPOL'-ZOVANIYE I OKHRANA VODNYKH RESUR-SOV LITOVSKOY SSR),
R. I. Darshkus.
Vodnyye Resursy, No 3, p 18-24, 1972. 2 fig, 6 ref.

Descriptors: *Water resources, *Water utilization, *Water conservation, *Administration, Water allocation (Policy), Water control, Water requirements, Water supply, Inspection, Maps.
Identifiers: *USSR (Lithuania).

In Lithuania there are about 30,000 large and small rivers with a total length of 63,700 km. Ninety-seven percent of these rivers are small streams not exceeding 10 km in length. The number of longer rivers is 758. The number of lakes having an area greater than 0.5 ha is 2,834. Their total area is 87,702 ha or about 1.35% of the country's land area. As of January 1,1972, bathymetric maps have been constructed for 700 lakes with a total area of 72,900 ha (83%). Surface runoff in average water years is 26 cu km, and, in low-water years of 95% probability, drops to 18 cu km. Average annual streamflow varies between 5 and 13 liters/sec/sq km and averages about 7.5 liters/sec/sq km. There are 91 gaging stations in the Republic, of which one, located on the Neman River at Smalininkai, has been in operation since 1811. Groundwater yield is about 3.2 million cu m/day and satisfied potable-water requirements of the Republic. Lithuania is one of the few areas where potable-water supply is based on subsurface water sources. The importance of developing schemes for the comples use and conservation of water resources in river basins is noted, and the present system of supervision over utilization and conservation of water in the Republic and public participation in water conservation affairs are discussed. (Josefson-USGS)
W74-01970

SUBSURFACE QUALITY TRANSFORMATIONS DURING THE INITIATION OF A NEW STA-BILIZATION LAGOON,
Arizona Univ., Tucson. Water Resources Research Center.
For primary bibliographic entry see Field 05D.
W74-01972

GROUND DISPOSAL OF REACTOR COOLANT EFFLUENT,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05B.
W74-02013

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME I - SUMMA-RY,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02043

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02044

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
G. H. Shafer, and E. T. Baker, Jr.
Texas Water Development Board Report 173, July 1973. 162 p, 21 fig, 10 tab, 44 ref.

Descriptors: *Groundwater resources, *Water wells, *Aquifer characteristics, *Hydrogeology, *Texas, Water utilization, Well data, Water yield, Pumping, Water level fluctuations, Water quality, Chemical analysis, Groundwater movement, Drillers logs, Basic data collections.
Identifiers: Kleberg County (Tex), Kenedy County (Tex), Southern Jim Wells County (Tex).

Kleberg, Kenedy, and southern Jim Wells Counties in south Texas on the West Gulf Coastal Plain cover an area of about 2,540 square miles. The entire area is dependent upon its groundwater resources. The Goliad Sand, which is tapped by wells throughout the report area, is the principal aquifer. The water is under artesian pressure and is yielded to flowing and nonflowing wells. The Goliad supplies all the groundwater for public supplies and irrigation, about 98% of the water used by industry, and about 95% of the water for rural-domestic and livestock needs. During 1968, about 18,000 acre-feet of groundwater was withdrawn for all purposes. Water levels in wells in the Goliad Sand declined significantly from 1932-33 to 1968-69. The quality of water from these wells deteriorates at depths greater than 1,000 feet, and the salinity of the water increases eastward. The area most favorable for the development of additional groundwater supplies from the Goliad Sand is in west-central Kenedy County, where the sands are thichest and where the present rate of development is relatively small. (Woodard-USGS)
W74-02138

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
C. R. Follett.
Texas Water Development Board Report 174, August 1973. 95 p, 13 fig, 11 tab, 34 ref.

Descriptors: *Groundwater resources, *Water wells, *Aquifer characteristics, *Water utilization, *Texas, Water quality, Water yield, Well data, Water levels, Drillers logs, Water analysis, Chemical Analysis, Basic data collections, Hydrogeology.
Identifiers: *Blanco County (Tex).

The geologic and hydrologic units in Blanco County, Texas, that yield water to wells, or are capable of yielding water, range in age from Precambrian to Quaternary. Groundwater is used primarily for rural-domestic and stock needs, and to a lesser extent for municipal supply and irrigation. Use of groundwater for all purposes in 1968 was about

1,400 acre-feet or 1.2 mgd. Of this amount, about 1,300 acretfeet was used for rural-domestic and stock needs. Only 15 acre-feet of groundwater was used for public supply. The yields of wells range from less than 1 to about 600 gpm. The potential yield of wells drilled in most places in the county is from 10 to 25 gpm. Groundwater of good to fair quality for public and domestic supplies is available in most of the county, and much of the water meets the standards recommended by the U.S. Public Health Service. Hardness is the most objectionable property. (Woodard-USGS)
W74-02141

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENT IN SANDS: II. GROUND WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-02148

4C. Effects on Water of Man's Non-Water Activities

EFFECT ON STREAMFLOW OF FOREST CUTTING AND CHANGE IN REGROWTH ON CUT-OVER AREA, (IN JAPANESE),
Government Forest Experiment Station, Tokyo (Japan).
H. Nakano.
Bull Gov For Exp Stn (Tokyo). 240 p,1-251. 1971, Illus, (English summary).
Identifiers: Cutover areas, *Forest cutting, Growth, Streamflow, Regrowth, *Clear cutting, *Japan.

To clarify the effects on streamflow of clear cutting, selection cutting, and change in regrowth and terracing on the cut-over area, some analyzes were made for the hydrological data obtained from 4 Experimental Sites, Government Forest Experiment Station, Japan, and from Wagon Wheel Gap Experimental Forest, Colorado, USA. The results were compared, among each of these major areas, as well as with other areas for which data were available.--Copyright 1973, Biological Abstracts, Inc.
W74-01782

ENVIRONMENTAL SURVEY OF THE TETON RIVER AND HENRY'S FORK OF THE SNAKE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 04A.
W74-01839

URBAN GROWTH AND THE WATER REGIMEN. HYDROLOGIC EFFECTS OF URBAN GROWTH,
Geological Survey, Washington, D.C.
J. Savini, and J. C. Kammerer.
Water-Supply Paper 1591-A. 1961. 42 p, 6 fig, 2 tab.

Descriptors: *Water supply, *Water demand, Water resources, *Urbanization, *Hydrologic aspects, Water quality, Environmental effects, Pollution, Drainage, Storm runoff.

The hydrologic impact of urbanization, which includes the effects of increased population density and the concentration of residential, industrial, and commercial buildings and facilities with the resultant increase of impervious areas, consists of the influence of these changes on the natural drainage runoff, ground water, sediment, water quality and demands, and measures for disposal of wastes and surplus waters. Urbanization raises a two-sided problem, namely, an increased demand for water for municipal, industrial, and recreational purposes and a decrease in locally generated ground-water supply because of increased impervious surfaces. The disposal of domestic sewage and industrial water without contamination of natural water courses of aquifers is an additional problem. The stages of urbanization and their effects on hydrology are outlined, prior to presenting a classification of hydrologic effects, consisting of (1) the sequence of usual occurrence, (2) changes separately associated with man's use of water and man's use of the land, (3) type of hydrologic process affected, or (4) changes affecting the quantity and quality of water. The effects on the quantity of water supply are discussed, in terms of trends in water use; per capita use of water; urban demand versus supply; change from agricultural to urban use; evaporation, transpiration and infiltration; ground-water levels and pressures; artificial ground-water recharge; and use of waste water. The effects on quality of water supply in terms of disposal of wastes; effects of wastes on aquatic life; and contamination of aquifers are discussed. Drainage and storm runoff problems are discussed. An evaluation is made of the relative significance of the various effects due to urbanization. (Edwards-North Carolina)
W74-01847

NATURAL CONCERN: AN ECOLOGICAL ANALYSIS OF BIBB COUNTY.
Macon-Bibb County Planning and Zoning Commission, Macon, Ga.
For primary bibliographic entry see Field 06G.
W74-01848

4D. Watershed Protection

ESTIMATING THE LAND SLOPE OF MOUNTAIN WATERSHEDS,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
For primary bibliographic entry see Field 02A.
W74-01715

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME ONE: INVENTORY FINDINGS AND FORECASTS.
Southeastern Wisconsin Regional Planning Commission, Waukesha.

Planning Report No. 12, April, 1969. 445 p, 100 fig, 53 maps, 95 tab, 14 append.

Descriptors: *Watershed management, *Wisconsin, *Natural resources, *Urbanization, *Flood damage, Planning, Hydrology, Land use, Water quality, Recreation, Water demand, Water law, Recreation demand, *Comprehensive planning.
Identifiers: Land use planning, *Fox River watershed (Wis), Environmental corridors.

The natural resource supply and the urbanization demand characteristics of the Fox River watershed are analyzed in great detail. The watershed is located in the rapidly urbanizing and highly recreation-oriented southeastern corner of Wisconsin. Focus is on water resources, however, the study is part of an overall planning program which includes land use, transporation, and utility plans. The first volume of the study consists of (1) statements of planning principles and concepts; (2) urban characteristics of the watershed, e.g. population, economy, and land use, and the projected growth in these variables; (3) natural characteristics including soils, vegetation, geology, climate, water resources, and wildlife; (4) the hydrology, flood characteristics, and simulated flows of the streams under varying conditions; (5) the quality of the surface water and groundwater; (6) urban water use demands; (7) recreation demands and recreation-related resource problems in the lakes, wetlands, woodlands, etc.; and (8) the nature of water law in Wisconsin. (See also W74-01857) (Elfers-North Carolina)
W74-01856

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME TWO: ALTERNATIVE PLANS AND RECOMMENDED PLAN.
Southeastern Wisconsin Regional Planning Commission, Waukesha.

Planning Report No. 12, February, 1970. 497 p, 40 fig, 18 maps, 71 tab, 7 append.

Descriptors: *Wisconsin, *Watershed management, *Land use, Planning, Water resources development, Flood control, Water quality control, Project planning, Institutions, Non-structural alternatives, Water pollution control, *Comprehensive planning.
Identifiers: *Watershed development plans, *Fox River watershed (Wis), Land use planning, Environmental corridors.

Alternative watershed plans and programs are posited and analyzed for the Fox River watershed and a synthesis of the best elements of these is ultimately recommended to be implemented. The plan elements and analyses are based upon the detailed data collected for the urbanizing watershed in volume one of the report. This second volume emphasizes the strong relationships between land use and water resource development. The report includes sections on land use and open space plan elements, e.g. environmental corridors in marshes, wetlands, and woodlands; alternative flood control, water pollution control, and water supply plan elements; the probable land use patterns and implications in the absence of planning and land use controls; and the recommended plan including both structural and non-structural elements. A key section is on plan implementation which outlines the relevant agencies and their powers and discusses various tools such as zoning ordinances, land acquisition, tax policies, soil and water conservation practices, advanced treatment plants, and flood control structures. (See also W74-01856) (Elfers-North Carolina)
W74-01857

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR NORTH CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
E. D. Lucero.
Open-file report (Texas District), August 1973. 23 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Engineering structures, Flood protection, Data collections, Soil conservation, Rain gages, Gaging stations.
Identifiers: *Trinity River basin (Tex), North Creek.

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. This report contains the rainfall and runoff data collected during the 1971 water year for the 21.6-square-mile area above the stream-gaging station North Creek near Jacksboro, Texas. The locations of floodwater-retarding structures (built and proposed) and hydrologic-instrument installations are shown. The average rainfall in the study area during the 1971 water year was 24.74 inches, which is considerably less than the 14-year average of 30.13 inches for the period 1958-70. Monthly rainfall totals ranged from 0.19 inch in January to 5.77

ches in September. The yearly mean discharge as 0.79 cfs compared with the 14-year (1956-70) erage of 5.75 cfs prior to the construction of the odwater-retarding structures. The annual runoff the stream-gaging station was 571 acre-feet, or 50 inch. Only the storm of September 22-23, 71, qualified for detailed computation in the 71 water year. Occurrence of rainfall and scharge was computed on basis of a refined time eakdown. Pattern of the storm is illustrated by drograph and mass curves. (Woodard-USGS)
74-01884

NNUAL COMPILATION AND ANALYSIS OF YDROLOGIC DATA FOR PIN OAK CREEK, RINITY RIVER BASIN, TEXAS, 1971,
eological Survey, Austin, Tex.
B. Hampton.
pen-File report (Texas District), September 73. 18 p, 2 fig, 2 tab.

escriptors: *Hydrologic data, *Small atersheds, *Erosion control, *Texas, *Rainfall-noff relationships, Storms, Flood control, Soil nservation, Data collections, Flood protection, ngineering structures, Rain gages, Gaging sta-ons.
entifiers: *Trinity River basin (Tex), Pin Oak reek.

he U.S. Soil Conservation Service is actively en-ged in the installation of flood- and soil-erosion ducing measures in Texas. As part of this pro-ct, hydrologic investigations of small watershed udy areas were begun by the U.S. Geological rvey in 1951 and are now being made in 12 eas. Average r all over the Pin Oak Creek study ea for the 1971 water year was 19.78 inches, or % of the long-term normal (1931-60) rainfall of .06 inches. Rainfall was scattered throughout the ar with every month receiving some rainfall. he yearly mean discharge at the stream-gaging ation Pin Oak Creek near Hubbard was 0.27 cfs, mpared with the 15-year (1957-71) average of .9 cfs. The annual runoff was 193 acre-feet, or 21 inches, which represents 1% of the total rain-ll. Six floodwater-retarding structures in the udy area have a combined total capacity of 3,480 re-feet at the emergency spillway crests and rtly control runoff from 9.68 square miles of the .6-square-mile area above the stream-gaging sta-on. Pertinent information relating to each struc-re is given. No storm periods were selected for tailed computations and analyses. Below-nor-al rainfall for the year did non produce any sig-ficant runoff events. (Woodward-USGS)
74-01889

EVENTEEN-YEAR SEDIMENT PRODUCTION ROM A SEMIARID WATERSHED IN THE OUTHWEST,
orest Service (USDA), Fort Collins, Colo. Rocky ountain Forest and Range Experiment Station.
F. Aldon, and G. Garcia.
esearch Note RM-248, September 1973. 4 p, 1 g, 1 tab, 9 ref.

escriptors: *Sedimentation, *Sediment trans-ort, *Watersheds (Basins), *New Mexico, *Sedi-ent yield, Environmental effects, Plant growth, itter, Correlation analysis, Alluvial fans, emiarid climates, Erosion control, Sediment con-ol, Sedimentation rates.
entifiers: *Rio Puerco drainage (N Mex).

verage annual rate of sediment production eclined 71 percent in the period 1967-71 com-ared with the period 1956-66 on a 471-acre atershed on the Rio Puerco drainage in New exico. Sediment declined as a result of increased ant size and litter production on the alluvial ood plain above the reservoir. As sediment-laden ash floodwaters hit the alluvial fan, they were owed down by plants and litter long enough to low sediment to settle out above the reservoir. Perennial grass production has steadily increased from 73 pounds per acre in 1956 to a high of 721 pounds in 1969. (Woodard-USGS)
W74-01948

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
J. K. VanZandt.
Open-file report (Texas District), June 1973. 52 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Texas, *Erosion control, *Rainfall-runoff relationships, Storms, Data collections, Hydrographs, Mass curves, Flood control, Soil conservation, Rain gages, Gaging stations.
Identifiers: *Brazos River basin (Tex.), Little Pond Creek, North Elm Creek.

The Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. The average rainfall during the 1971 water year on the Little Pond Creek study area was 23.31 inches, or approximately 31% below the average annual rainfall of 33.85 inches at Cameron (1931-60). The average rainfall on the North Elm Creek study area was 22.10 inches, or approximately 38% below the average annual rainfall of 33.85 inches at Cameron. For the 1971 water year four storms were selected for detailed computations. These computations include detailed time breakdown of rainfall and discharge. Hydrograph and mass curves are drawn for illustrations. The storms selected occurred on October 22-23, 1970, May 8-9, 10-11, and 27-28, 1971. A summary of rainfall-runoff data for these storms is shown. (Woodard-USGS)
W74-01950

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR HONEY CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
B. B. Hampton.
Open-file report (Texas District), August 1973. 28 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Flood protection, Engineering structures, Soil conservation, Data collections, Rain gages, Gaging stations.
Identifiers: *Trinity River basin (Tex), Honey Creek.

The Soil Conservation Service is actively engaged in the installation of flood and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watershed study areas were begun by the U.S. Geological Survey in 1951 and are now being made in 12 areas. There are 13 floodwater-retarding structures located in the Honey Creek watershed. These structures provide capacity for flood-detention storage of 6,930 acre-feet of flood runoff from 24.6 square miles of the 39.0-square-mile drainage area. The rainfall in the study area for the 1971 water year was 22.35 inches, or 65% of the 18-year (1954-71) average of 34.27 inches. The monthly rainfall totals ranged from 0.27 inch in March to 3.83 inches in July. The yearly mean discharge at the stream-gaging station Honey Creek near McKinney was 1.05 cfs, compared with the 20-year average of 18.3 cfs. No storm periods for the 1971 water year were selected for detailed computations. (Woodard-USGS)
W74-01951

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
J. A. Watson.
Open-file report (Texas District), August 1973. 63 p, 3 fig, 3 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, Basic data collections, Rainfall-runoff relationships, Streamflow, Flow rates, Gaging stations, Rain gages, Storms, Flood protection.
Identifiers: *Brazos River basin (Tex.), Cow Bayou (Tex.), Mooreville (Tex.).

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. Hydrologic investigations of small watersheds were begun by the U.S. Geological Survey in 1951 and are now being made in 12 areas. This report, which is the 12th in a series of basic-data reports published annually for the Cow Bayou study area, contains the rainfall, runoff, and storage data collected during the 1971 water year for the 85.0-square-mile area above the stream-gaging station Cow Bayou at Mooreville, Texas. The location of floodwater-retarding structures and hydrologic-instrument installations in the area are shown. There are 26 floodwater-retarding structures in the study area with a combined capacity of 15,510 acre-feet below flood-spillway crests which regulate floodflows from an area of 42.7 square miles, or approximately 50% of the drainage area. The weighted-mean rainfall over the study area during the 1971 water year was 27.64 inches, or 84% of the 13-year (1959-71) average of 32.91 inches. Yearly mean discharge at the stream-gaging station was 12.5 cfs, compared with the 13-year average of 36.3 cfs. Annual runoff was 9,030 acre-feet, or 2.00 inches. A summary of rainfall-runoff data for storms on July 25, 29, and 29-30, 1971, is included. (Woodard-USGS)
W74-02137

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MUKEWATER CREEK, COLORADO RIVER BASIN TEXAS, 1971,
Geological Survey, Austin, Tes.
J. N. Lee.
Open-file report (Texas District), 1973. 89 p, 2 fig, 3 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Flood protection, Engineering structures, Soil conservation, Data collections, Rain gages, Gaging stations, Hydrographs, Mass curves.
Identifiers: *Colorado River basin (Tex.), Mukewater Creek.

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. The six floodwater-retarding structures in the Mukewater Creek watershed have a combined total capacity of 6,000 acre-feet and control an area of 27.6 square miles, or 39% of the drainage area. The weighted-mean rainfall over the Mukewater Creek study area for the 1971 water year was 24.93 inches, approximately equal to the 18-year (1954-71) average of 24.64 inches. Monthly rainfall ranged from zero in November, January, and March to 7.62 inches in August. Yearly mean discharge at the stream-gaging station was 10.4 cfs, compared with the 20-year (1952-71) average of 10.8 cfs. Annual runoff at the stream-gaging station was 7,520 acre-feet, or 2.01 inch. Thus, only 8.1% of the rain falling on the watershed went past the gaging station at Trickham. For the 1971 water year, three storms occurred on August 1-2, 13, and September 22-24 and were selected for computa-

tion at each recording site. These computations include detailed time breakdown of rainfall and discharge. Hydrographs and mass curves are drawn for illustrations. A summary of rainfall-runoff data for the storms is shown. (Woodard-USGS)
W74-02140

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

HIGH SENSITIVITY LASER ABSORPTION SPECTROSCOPY OF LABORATORY AQUEOUS SOLUTIONS AND OF NATURAL MISSOURI WATERS. A FEASIBILITY STUDY,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 02K.
W74-01658

INFRARED REFLECTANCE MEASUREMENTS OF MISSOURI WATERS FOR WATER QUALITY APPLICATIONS,
Missouri Univ., Kansas City. Dept. of Physics.
C. Waring, M. R. Querry, W. E. Holland, M. D. Hermann, and L. M. Earls.
Available from the National Technical Information Service as PB-225 420/9, $3.75 in paper copy, $1.45 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, August 1973. 80 p, 12 fig, 13 ref, append. OWRR A-063-MO (1). 14-31-0001-3825.

Descriptors: *Infrared radiation, *Spectroscopy, *Missouri, *Acid mine water, Measurement, Soil analysis, Nitrates, Mine drainage, Refraction, *Reflectance, *Pollutant identification, Water quantity.

The relative specular reflectance of laboratory solutions of 3.0 M Sulfuric Acid and 0.5 M Sodium Nitrate was measured in the 2.0 - 20-micrometer wavelength region of the infrared. The relative specular reflectance of natural samples of (1) acid mine drainage taken from a ditch leading from the Peabody Mark Twain Mine to Hinkson Creek; (2) surface water runoff from an agricultural plot which had received a 314 lb/acre application of nitrate fertilizer; and (3) an oil sample from the Mexico, Missouri oil release into the Salt River was measured in the same spectral region. The data were collected using a Perkin Elmer E-14 spectrophotometer and a reflectometer consisting of a Cassegrain unit which collimated the radiant flux to about 18 mrad divergence, a sample holder and a Cassegrain condenser for focusing the radiant flux, reflected by the sample, onto the entrance slit of the monochromator. The angle of incidence was 70 deg. The index of refraction, extinction coefficient and phase difference spectrum throughout the 2-20-micrometer wavelength region was determined for the mine drainage, fuel oil, sulfuric acid, sodium nitrate and nitrate runoff samples using the relative reflectance measurements, the optical constants of distilled water and an algorithm for Kramers-Kronig analysis. The absolute eflectance spectrum of the alluvium and loess was determined using the relative reflectance measurements, the optical constants of distilled water and the Cauchy equation for reflectance.
W74-01659

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.
For primary bibliographic entry see Field 07B.
W74-01663

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 04B.
W74-01721

ACIDIFICATION AND BUBBLING AS AN ALTERNATIVE TO FILTRATION IN DETERMINING PHYTOPLANKTON PRODUCTION BY THE 14C METHOD,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler, R. V. Schmidt, and R. A. Reid.
J Fish Res Board Can, Vol 29, No 11, p 1627-1631, 1972, Illus.
Identifiers: *Acidification, *Bubbling, *Carbon-14 method, Filtration, *Phytoplankton production.

Acidification and bubbling is superior to membrane-filtration for post-incubation treatment of 14C-productivity samples. The method eliminates errors associated with filtration. Results are compared with those of conventional and corrected filtration procedures, and application of the method is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01749

A SIMPLE, PRACTICAL AND EFFECTIVE METHOD FOR THE ISOLATION OF SALMONELLA FROM SURFACE WATER,
Brussels.
E. Van Goethem, E. Van Oye, and L. Maes.
Zentralbl Bakteriol Parasitekd Infektionskr Hyg Reste Abt Orig Reihe A Med Microbiol Parasitol. Vol 221, No 2, p 280-282, 1972. (English summary).
Identifiers: *Isolation, *Salmonella, Surface waters, Water pollution, Filtration.

The search for Salmonella in surface waters is considerably facilitated by preliminary filtration through paper. The chances of isolation are particularly improved by increasing the number of media. This test is done to determine the extent of water pollution by the organism.--Copyright 1973, Biological Abstracts, Inc.
W74-01768

ESTIMATION OF THE BACKGROUND CONTAMINATION OF THE ATMOSPHERE FROM THE CHEMICAL COMPOSITION OF PRECIPITATION,
Main Geophysical Observatory, Leningrad (USSR).
E. S. Selezneva.
Tellus. Vol 24, No 2, p 122-127, 1972. Illus.
Identifiers: Atmosphere, Chemical composition, Contamination, *Precipitation (Atmospheric), *USSR.

The relationship of marine and continental constituents in precipitation is considered and the values of the background concentrations for different geographical regions are defined. On the basis of these relations, conclusions are drawn concerning the geographical variation, which depends on natural conditions and man's activity. Over the continental areas of the USSR the background level averages 30-40% of the total contamination, the local sources contribute 60-70%, of which 20-30% can be attributed to natural sources (soil dust, etc.), and the rest to contamination of anthropogenic origin, the latter even for the most remote clean regions is about 20-30%.--Copyright 1973, Biological Abstracts, Inc.
W74-01769

THE DETERMINATION OF PART-PER-BILLION LEVELS OF CITRIC AND NITRILOTRIACETIC ACIDS IN TAP WATER AND SEWAGE EFFLUENTS,
Missouri Univ., Columbia. Environmental Trace Substance Center.
W. A. Aue, C. R. Hastings, K. Gerhardt, J. O. Pierce, II, and H. H. Hill.
J Chromatogr. Vol 72, No 2, p 259-267. 1972, Illus.
Identifiers: *Gas chromatography, *Citric acid, Detergents, *Nitrilo triacetic acid, *Sewage effluents, *Potable water.

Citric and nitrilotriacetic (detergent additives) acids can be determined at the 1-10,000 ppb levels in aqueous systems ranging from tap water to sewage effluents by use of anion-exchange clean-up, derivatization with butanol-HCl and gas chromatography. A variety of metals present at legal tolerance limits do not interfere. The 2 esterified acids separate well on a special gas chromatographic phase; citric acid can also be separated from nitrilotriacetic acid by ion exchange prior to derivatization, if so desired.--Copyright 1973, Biological Abstracts, Inc.
W74-01772

THE CHEMICAL ANALYSIS OF NUTRIENTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05C.
W74-01802

BIOASSAY ANALYSIS OF NUTRIENT AVAILABILITY,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 05C.
W74-01803

WATER QUALITY IN THE CONSERVATION AREAS OF THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT, 1970--72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05B.
W74-01881

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01885

MEASUREMENTS PROGRAM FOR OIL-SLICK CHARACTERISTICS--FINAL REPORT,
Michigan Univ., Ann Arbor. Willow Run Labs.
For primary bibliographic entry see Field 05B.
W74-01941

INVESTIGATION OF RELIEF WELLS, MISSISSIPPI RIVER LEVEES, ALTON TO GALE, ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 04B.
W74-01942

REMOTE SENSING OF WATER POLLUTION AND PHYTOPLANKTON BY OPTICAL METHODS (DISTANTSIONNOYE OBNARUZHENIYE ZAGRYAZNENIY VODNYKH BASSEYNOV I FITOPLANKTONA OPTICHESKIMI METODAMI),
Leningrad State Univ. (USSR).
K. Ya. Kondrat'yev, A. A. Buznikov, and D. V. Pozdnyakov.
Vodnyye Resursy, No 3, p 65-75, 1972. 3 fig, 19 ref.

Descriptors: *Pollutant identification, *Water pollution sources, *Oil spills, *Phytoplankton,

*Remote sensing, Analytical techniques, Instrumentation, Optical properties, Chlorophyll, Oil-water interfaces, Surfaces, Reviews.
Identifiers: USSR.

One of the effects of the ever-increasing volume of industrial production today is the progressive contamination of water basins. The most serious sources of pollution are industrial wastes and oil spills. A study is made of the use of optical instruments to remotely sense oil films and areas of intensified phytoplankton production on water surfaces. A review of analytical techniques and instrumentation designed for these purposes is based on data of Soviet and foreign literature. Spectral characteristics of water, oil, and chlorophyll in the optical range of wavelengths are graphed, and ways are indicated for further improvement of optical methods of remote sensing and for possible expansion of the sphere of their application in the national economy. (Josefson-USGS)
W74-01966

ACHIEVEMENTS AND IMMEDIATE TASKS OF HYDROCHEMISTRY ON THE FIFTIETH ANNIVERSARY OF THE FOUNDING OF THE USSR (DOSTIZHENIYA GIDROKHIMII ZA 50 LET SUSHCHESTVOVANIYA SSSR I YEYE BLIZHAYSHIYE ZADACHI),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
For primary bibliographic entry see Field 02K.
W74-01969

BACTERIOLOGICAL STUDIES ON GRAVEL PIT LAKES (BAKTERIOLOGISCHE UNTERSUCHUNGEN AN BAGGERSEEN),
Von K. Thurner, and M. Busse.
Archiv fur Hydrobiologie, Vol 72, No 2, p 253-262, July 1973. 5 fig, 20 ref. 23*Aquatic bacteria, *Aerobic bacteria, *Pollutant identification, *Separation techniques, Systematics, Biological communities, Speciation, Groundwater, Isolation.
Identifiers: *Gravel pits, *Biochemical tests, Pseudomonads, Achromobacteria, Coryneform bacteria.

Nine hundred ninety-eight isolates of aerobic bacteria from gravel pit lakes have been differentiated using a provisional key for the differentiation of water bacteria based on gram staining, O/F-test, cyctochrome oxidase and acid formation. The predominant groups obtained apparently are related to the coryneform bacteria, pseudomonads and achromobacteria. The differentiation does not yield taxonomically homogenous groups. In spite of the present deficiencies in the analysis of the flora composition quite different results have been obtained for two ground water lakes as compared with a more eutrophic lake. This seems to indicate that eventually a practical oecology of water bacteria is feasible. (Holoman-Battelle)
W74-01976

THE MAJOR IONS OF SOME LAKES AND OTHER WATERS IN QUEENSLAND, AUSTRALIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 02H.
W74-01979

MERCURY POLLUTION OF LAKE ERIE ECOSPHERE,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 05B.
W74-01985

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS AND SOLID WASTE FROM NUCLEAR POWER PLANTS FOR 1972.
Directorate of Regulatory Operations (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W74-02011

CESIUM DISTRIBUTION IN THE SURFACE LAYER OF THE PACIFIC OCEAN,
For primary bibliographic entry see Field 05B.
W74-02055

RADIOACTIVITY MEASUREMENTS AT TARAPUR NUCLEAR POWER STATION ENVIRONMENT,
For primary bibliographic entry see Field 05B.
W74-02056

DISTRIBUTION OF RA-226 IN SOIL AND WATER,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W74-02057

RADIORUTHENIUM IN AQUATIC ENVIRONMENT OF TROMBAY,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W74-02058

SLIDE GLASS METHOD FOR TESTING SLIME IN INDUSTRIAL WATER AND WASTE (IN JAPANESE),
Tokyo Univ. (Japan). Faculty of Pharmaceutical Sciences.
K. Shimizu, and S. Suzuki.
J Hyg Chem. Vol 18, No 1, p 19-22, 1972, Illus. (English summary).
Identifiers: Bacteria, *Colony count method, *Industrial wastes, *Slide glass method, Slime, Testing, Treatment facilities.

Comparison of the slide glass method with the colony count method gave the same results for bacterial growth, requirement of N, effect of bactericides and growth of bacteria in natural water. The slide glass method seemed useful requiring little effort for observing the growth of periphytic microbes in water treatment plants.--Copyright 1973, Biological Abstracts, Inc.
W74-02073

DIAGNOSTIC TECHNIQUES FOR EVALUATING IRRIGATION WATER QUALITY,
Haryana Agricultural Univ., Hissar (India). Dept. of Soils.
S. P. Dixit, R. M. Singh, and B. R. Tripathi.
Haryana Agric Univ J Res. Vol 1, No 2, p 35-40. 1971.
Identifiers: Anions, Cations, *Diagnostic techniques, Electrical conductivity, *India (Agra), Irrigation water, Regression equations, *Water quality.

About 60 water samples were analyzed for electrical conductivity (EC) and different cations and anions from different irrigation sources of Agra, India. EC was highly and positively correlated with cations and anions. Highly positive significant multiple correlations were also found with EC as 1 factor, various cations and anions as independent variables, cations and anions as 1 variable and remaining cations or anions as independent variables. Various regression equations derived can be used as a measure of different cations, anions, total soluble salts and total salts per acre foot etc.--Copyright 1973, Biological Abstracts, Inc.
W74-02083

INDEX OF DRINKING WATER POLLUTION: TOTAL COLIFORM MPN TESTS: CONFIRMED TEST VERSUS COMPLETED TEST,
British Columbia Provincial Lab., Vancouver.
E. J. Bowmer, and J. A. K. Campbell.
Can J Public Health. Vol 63, No 4, p 355-358. 1972, Illus.
Identifiers: *Coliform MPN tests, *Pollution index, *Potable water, *Test comparisons.

Comparison of the results of the Confirmed and Completed Tests in the Multiple Tube Fermentation Technique revealed that it is not necessary to carry out Completed Tests on all samples of drinking water yielding positive results in the Confirmed Test. The value of the Confirmed Test in determining the sanitary quality of such water supplies was established. Of 1170 samples with positive Completed Tests, 250 gave positive results (5/5 to 1/5) after 24 hr in the Presumptive and Confirmed Tests; and only 5 gave negative results (0/5) in the Completed Test. By eliminating the Completed Test on these samples (now reported as '5/5 Confirmed Test') a 13% saving of laboratory effort can be achieved.--Copyright 1973, Biological Abstracts, Inc.
W74-02087

CONTRIBUTION TO MINERAL NUTRITION OF CATTLE FROM DRINKING WATER,
E. M. Soder, and I. A. Dyer.
Can J Anim Sci. Vol 52, No 1, p 197-198. 1972.
Identifiers: *Canada (British Columbia), *Cattle, *Mineral nutrition, Ponds, Rivers, Valleys, Water wells, *Potable water.

A survey was undertaken in 1968 in the valleys and rivers of British Columbia, Canada. A total of 46 samples of well, stream and pond drinking water were analyzed for elements using an atomic absorption spectophotometer. Ca, Mg, Na and K levels and those of the trace elements Zn, Cu, Mn, Se, Mo, Fe and Co were determined while the concentrations of P and NO3 were determined on selected samples using an ammonium metavanadate method for P and the specific ion electrode for NO3. The trace element content of water was not sufficiently high to make a significant contribution to cattle nutrition. The elements Se, Mo, Fe and Co were not detected in the samples. Assuming a daily water consumption of 25 kg, the highest contributor to daily mineral requirements was Cu at 2.5%.--Copyright 1973, Biological Abstracts, Inc.
W74-02103

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W74-02139

5B. Sources of Pollution

WATER POLLUTION BY DAIRY FARM WASTES AS RELATED TO METHOD OF WASTE DISPOSAL,
Auburn Univ., Ala. Dept. of Animal and Dairy Science.
T. A. McCaskey, G. H. Rollins, and J. A. Little.
Available from National Technical Information Service as PB-225 470/4 $3.75 in paper copy; $1.45 in microfiche. Alabama Water Resources Research Institute Bulletin 18, 1973. 86 p, 12 fig, 24 tab, 3 append. OWRR B-017-ALA (2).

Descriptors: *Dairy industry, *Waste disposal, Soil disposal fields, Irrigation waste water, Lagoons, Runoff, Water quality, *Farm wastes, *Farm lagoons, Waste treatment.
Identifiers: *Waste disposal methods, *Field spreading, Manure loading rates, Runoff quality, Lagoon efficiency.

Three field spreading methods and a lagoon system were evaluated for the disposal of dairy-cow waste. Three rates of waste were applied to grassland plots by each of the field spreading methods for 27 months. Runoff water was collected from the plots, and also from a check plot to evaluate runoff water quality. The scrape-haul method contributed more BOD load to runoff, and more fecal coliforms and nitrate to the soil than the irrigation or tank-wagon methods. The most BOD and nitrate in runoff during 1971 for all methods of field spreading waste occurred during August during which the rainfall was lowest for the year. The least BOD and nitrate in runoff coincided with the month of most rainfall (March). At 10 to 21 tons waste applied annually on grassland there was not an appreciable deterioration of runoff water quality nor buildup of soil nitrate. A two-stage lagoon system designed for 300 cu ft storage capacity per cow in the first stage and 643 cu ft capacity in the second stage for cows using milking facilities reduced BOD, 95%, COD, 93%, Kjeldahl-nitrogen, 82%, and fecal coliforms, 99%. For herds of 120 cows in confinement the estimated annual cost per cow for manure management by the irrigation method was $30.31 and $24.07 for the scrape-haul method. The cost for systems that accommodated cows during milking was estimated at $11.24 per cow for the lagoon method and dated cows during milking was estimated at $11.24 per cow for the lagoon method and $21.21 per cow for the tank-wagon method.
W74-01651

RELATIVE LEACHING RATES OF COMMON NITROGEN CARRIERS FROM SANDY SOILS IN RELATION TO LAKE EUTROPHICATION,
Rollins Coll., Winter Park, Fla. Dept. of Biology.
D. E. Smith.
Available from the National Technical Information Service as PB-225 474/6 $3.75 in paper copy; $1.45 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 22, July 1973 72 p, 33 fig, 6 tab, 17 ref, 2 append. OWRR A-018-FLA (1), 14-31-0001-3509 and 14-31-0001-3809.

Descriptors: Fertilizers, *Eutrophication, *Nitrogen compounds, *Leaching, Sands, Soil types, Litter, Soil columns, Nutrients, Lakes, *Florida, Path of pollutants, *Storm water, Urban runoff.
Identifiers: Lawn fertilization, *Sandy soils, Winter Park (Fla.), Street litter.

A study of three sands in sterilized columns revealed that, with the exception of nitrate, the mineral fraction of these soils is moderately resistant to leaching of several common nitrogen carriers. It is proposed that this resistance to leaching provides an effective buffer against increased nutrient loadings of ground water by heavy applications of manufactured fertilizer. A principal conclusion of the study is that accelerated lake eutrophication is taking place because surface waters are being nourished at levels above that normally provided by ground water seepage. It is believed that much of this hypernourishment is brought about by direct flushing of large amounts of material of biological origin into the lake basins by storm water.
W74-01654

THE ROLE OF MOLECULAR DIFFUSION IN DISPERSION THEORY,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 02E.
W74-01713

SEPTIC SYSTEMS: EFFECTS OF SURFACE AND SUBSURFACE WATER,
Lake County Health Dept., Waukegan, Ill.
L. Mellen.
Journal of Soil and Water Conservation, Vol 28, No 5, p 221-223, September - October 1973. 1 fig, 9 ref.

Descriptors: *Septic tanks, *Soil disposal fields, *Illinois, Waste water treatment, Waste disposal, Soil properties.
Identifiers: *Lake County (Ill).

In Lake County, Illinois, 80% of the soils have severe limitations for septic systems. Only 10% are ideally suited to such systems. These are deep loam and sandy loam soils. Another 10%, underlain with sand and gravel, are suitable for septic systems, but they could contribute to groundwater pollution. The 80% of the county's soils unsuitable for septic systems usually have slowly permeable subsoils or a water table within 1 to 3 feet of the soil surface. In the design of any septic system some basic rules apply. Seepage lines must follow contour lines exactly so they will not pick up groundwater. Curtain drains must be installed above the field on all soils with impervious clay subsoils to intercept the movement of groundwater. Soil placed over trenches should be similar to the original soil. All soils in which septic systems are installed must have at least 12 inches of permeable material below seepage lines. Because percolation tests vary seasonally, hydraulic conductivity of the soil should be determined. Where rainfall or septic effluent raises the water table, subsurface drainage with a suitable outlet is needed. (Knapp-USGS)
W74-01716

ORGANIC MATTER AND ELEMENTS IN THE HYDROLOGIC REGIMEN OF VOLGA RESERVOIRS (ORGANICHESKOYE VESHCHESTVO I ELEMENTY GIDROLOGICHESKOGO REZHIMA VOLZHSKIKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.

Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), N. V. Butorin, editor, Leningrad, 1972. 248 p.

Descriptors: *Organic mater, *Regimen, *Hydrologic cycle, *Reservoirs, Lakes, Water levels, Runoff, Fluctuations, Cycles, Microbiology, Aquatic life, Inorganic compounds, Chemical analysis, Bottom sediments, Suspended solids, Water properties, Water pollution, Statistical methods, Correlation analysis, Seasonal.
Identifiers: *USSR (Volga River), Spectrograms.

Twenty-one papers are contained in No. 23 (26) of the Transactions of the USSR Academy of Science's Institute of Biology of Inland Waters published in 1972. Topics of individual papers include: (1) photosynthesis, destruction of ogranic matter, and dynamics of bacteria populations in the Rybinsk Reservoir in 1968; (2) microbiological characteristics of the Rybinsk Reservoir in 1969; (3) organic matter in water of the Volga River and its reservoirs in Jun 1966 and July 1969; (4) organic matter in Lake Onega and some water bodies of the Volga-Baltic Waterway in the summer of 1968; (5) concentration and distribution of nitrogen compounds in the Rybinsk Reservoir in summer and autumn; (6) elements in the balance of biogenic substances in the Kuybyshev Reservoir; (7) scientific bases for forecasting concentrations of biogenic elements and organic matter in reservoirs; (8) changes in physical and chemical characteristics of water masses of the Rybinsk Reservoir; (9) sun-induced fluctuations of Volga runoff; (10) nature of 7-year cycles in long-term fluctuations of Volga runoff; (11) 2-year cyclic fluctuations of Volga runoff; (12) some features of the hydrologic regimen of Saratov Reservoir; (13) suspended-sediment balance in the Rybinsk Reservoir, (14) suspended-sediment balance in the Uglich Reservoir; (15) sediment-retaining capacity of the Uglich Reservoir; and (16) estimates of the pollution of Ivan'kovskoye Reservoir by bituminous substances. (Josefson-USGS)
W74-01723

ORGANIC MATTER IN WATER OF THE VOLGA RIVER AND ITS RESERVOIRS IN JUNE 1966 AND JULY 1969 (ORGANICHESKOYE VESHCHESTOVO V VODE VOLGI I YEYE VODOKHRANILISHCH V IYUNE 1966 G. I IYULE 1969 G.),
Akademiya Nauk SSR, Moscow. Institut Biologii Vnutrennkh Vod.
B. A. Skopintsev, A. G. Bakulina, Ye. M. Bikbulatova, N. A. Kudryavtseva, and N. I. Mel 'nikova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 39-53, Leningrad, 1972. 1 fig, 5 tab, 10 ref.

Descriptors: *Organic matter, *Rivers, *Reservoirs, Water properties, Biochemical oxygen demand, Oxygen, Dissolved oxygen, Color, Carbon, Oxidation, Water sampling, Waste water (pollution), Chemical analysis.
Identifiers: *USSR (Volga River), Organic carbon.

Permanganate oxidizability of waters of the Volga River and its reservoirs, determined in June 1966 in the navigable reach from Rybinsk Reservoir to Kuybyshev, differs little from results obtained in the spring and summer of 1954-55. The content of organic carbon in dry residues of evaporated waters in June 1966 approached oxygen values of permanganate oxidizability. The content of total organic carbon, determined for the first time in July 1969 in water samples collected in the reach from Rybinsk Reservoir to Astrakhan, varied between 7.2 and 10.3 mg/liter and was, on the average, 6% higher than the carbon content in dry residues. The 5-day BOD values in the reach varied between 0.72 and 2.3 mg/liter and averaged 1.3 mg/liter. Results of a chemical analysis of samples of waste waters collected from a number of cities and industrial enterprises on the Volga in June 1966 are tabulated. (See also W74-01723) (Josefson-USGS)
W74-01724

ORGANIC MATTER IN WATER OF LAKE ONEGA AND SOME WATER BODIES OF THE VOLGA-BALTIC WATERWAY IN THE SUMMER OF 1968 (ORGANICHESKOYE VESHCHESTVO V VODE ONEZHSKOGO OZERA I NEKOTORYKH VODOYEMOV VOLGO-BALTIYSKOGO VODNOGE PUTI LETOM 1968 G.),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
B. A. Skopintsev, A. G. Bakulina, and N. I. Mel 'nikova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 54-61, Leningrad, 1972. 4 tab, 19 ref.

Descriptors: *Organic matter, Bodies of water, *Lakes, *Reservoirs, *Inland waterways, Water properties, Biochemical oxygen demand, Oxygen, Color, Carbon, Oxidation, Water sampling, Summer.
Identifiers: *USSR (Lake Onega), *USSR (Volga River), *Baltic Sea, Organic carbon.

The content of organic carbon in dry residues in surface and deep waters of the open area of Lake Onega in July 1968 varied between 5.7 and 5.9 mg/liter. The ratio of oxygen of permanganate oxidizability to organic carbon was 1:1. The amount of organic matter oxidized in waters of Lake Onega after 120 days was 14%-18%, and in waters of the Rybinsk and Sheksna Reservoirs and Lakes Beloye and Siverskoye 23%-28%. (See also W74-01723) (Josefson-USGS)
W74-01725

CONTENT AND DISTRIBUTION OF NITROGEN COMPOUNDS IN THE RYBINSK RESERVOIR IN SUMMER AND AUTUMN (SODERZHANIYE I RASPREDELENIYE SOYEDINENIY AZOTA V RYBINSKOM VODOKHRANILISHCHE V LETNE-OSENNIY PERIOD),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
N. A. Trifonova, and L. A. Kalinina.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 73-79, Leningrad, 1972. 4 fig, 2 tab, 7 ref.

Descriptors: *Nitrogen compounds, *Reservoirs, *Summer, *Autumn, Nitrogen, Carbon, Organic matter, Oxidation, Phytoplankton, Chlorophyll, Suspended solids, Color, Water analysis, Chemical analysis, Water sampling.
Identifiers: *USSR (Rybinsk Reservoir), Organic carbon.

Total nitrogen content in the Rybinsk Reservoir in the summer of 1965 varied between 1.0 and 2.4 mg/liter in natural water and between 0.85 and 1.71 mg/liter in filtered water. The amount of organic nitrogen was 98% of total nitrogen. The content of ammonium nitrogen was generally within limits of 0.10-0.15 mg/liter in surface horizons and within limits of 0.2-0.3 mg/liter in bottom waters. The content of nitrate nitrogen was generally measured in hundredths or thousandths of a milligram per liter, and only in Volga waters did it reach higher values. The content of organic matter also varied widely and was accompanied by changes in the C:N ratio ranging from 6 to 15. By October, the content of organic matter in the reservoir water had decreased somewhat but was still comparatively high. The composition of organic matter was characterized by a wider C:N ratio (8-24). The total content of nitrogen at this time dropped to 0.9 to 1.76 mg/liter, while the amount of organic nitrogen remained high (68%-91%). The concentrations of mineral forms of nitrogen were small. The amount of suspended substances increased slightly, varying between 5 and 23 mg/liter. In summer the principal factor governing the content and distribution of different forms of nitrogen in the reservoir is the photosynthetic activity of phytoplankton. The distribution of water masses and the total content of organic substances during this period have little effect on the concentration, distribution, and forms of nitrogen compounds. A slightly greater effect is observed in autumn. (See also W74-01723) (Josefson-USGS)
W74-01726

NATURE OF SEVEN-YEAR CYCLES IN LONG--TERM FLUCTUATIONS OF VOLGA RUNOFF (O PRIRODE SEMILETNEY TSIKLICHNOSTI V MNOGOLETNIKH KOLEBANIYAKH STOKA VOLGI),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 02E.
W74-01727

SOME FEATURES OF THE HYDROLOGIC REGIMEN OF SARATOV RESERVOIR (NEKOTORYYE CHERTY GIDROLOGICHESKOGO REZHIMA SARATOVSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 04A.
W74-01728

SUSPENDED-SEDIMENT BALANCE IN THE RYBINSK RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V RYBINSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. A. Ziminova, and V. P. Kurdin.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 199-210, Leningrad, 1972. 5 tab, 34 ref.

Descriptors: *Reservoirs, *Sedimentation, *Reservoir silting, *Suspension, *Suspended solids, Deposition (sediments), Sediment load, Sediment discharge, Sediment yield, Bottom sediments, Erosion, Peat, Organic matter, Plankton, Productivity.
Identifiers: *USSR (Rybinsk Reservoir).

The balance of sediments in suspension in reservoirs is usually compiled to estimate the silting of water bodies and the direction of this process in time. Estimates are made of items in the balance of suspended sediments in the Rybinsk Reservoir for a 25-year period (1941-65). Major incoming items are suspended-sediment loads of rivers, plankton productivity, erosion of peat, and bank and bed erosion. Outgoing items are suspended-sediment discharge through the Rybinsk works, and deposition of bottom sediments. The role of azonal factors in bottom-sediment deposition during this period is examined, and consideration is given to reworking of sediments to calculate silting of large lake-like reservoirs. On the basis of changes occurring in the sediment-suspension balance in the 1960's, the rate of sedimentation was calculated to have decreased and the role of zonal factors in this process to have increased. As a result of curtailed uptake of suspended organic matter from local sources, the percentage of allochthonous organic suspensions in the total balance increased. (See also W74-01723) (Josefson-USGS)
W74-01729

SUSPENDED-SEDIMENT BALANCE IN THE UGLICH RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V UGLICHSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. A. Ziminova, and V. P. Kurdin.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 211-220, Leningrad, 1972. 4 tab, 23 ref.

Descriptors: *Reservoirs, *Sedimentation, *Suspension, *Suspended solids, Deposition (sediments), Sediment load, Sediment discharge, Sediment yield, Bottom sediments, Band erosion, Turbidity, Waves (water), Winds, Plankton, Aquatic plants, Productivity, Hydroelectric plants.
Identifiers: *USSR (Uglich Reservoir).

The equation of the balance of sediments in suspension in the Uglich Reservoir was based on results of investigations of sediment suspension in Upper Volga reservoirs. Estimates are made of items in the balance of suspended sediments in the reservoir for a 29-year period (1940-68). Incoming items are sediment load at the gaging station of the Ivan 'kovskdya Hydroelectric Plant, sediment loads of rivers, bank erosion, and productivity of plankton and higher aquatic vegetation. Outgoing items are sediment deposition, suspended-sediment discharge through the Uglich works, and suspended-sediment concentration in the water mass at the end of the design period. Analysis of temporal changes in the relation of balance items reveals a relative increase in recent years (1962-68) in the percentage of river sediments and plankton in the incoming part of the balance and an almost twofold increase in the relative amount of suspended-sediment discharge through the Uglich works in the outgoing part. (See also W74-01723) (Josefson-USGS)
W74-01730

SEDIMENT-RETAINING CAPACITY OF THE UGLICH RESERVOIR (O NANOSOUDERZHIVAYUSHCHEY SPOSOBNOSTI UGLICHSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 02J.
W74-01731

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.
For primary bibliographic entry see Field 05C.
W74-01732

THE USE OF AQUATIC MACROINVERTEBRATES AS INDICATORS OF STREAM POLLUTION,
Western Michigan Univ., Kalamazoo. Dept. of Biology.
C. J. Goodnight.
Trans Am Microsc Soc, Vol 92, No 1, p 1-13, 1973, Illus.
Identifiers: *Aquatic organisms, *Indicators (Pollution), *Invertebrates, Pollution, Streams.

The presence of aquatic organisms often provides the best indication of the condition of a stream. Most groups of aquatic organisms have been suggested as valuable indicator species. All groups have some merit but none are adequate alone. The tendency now is to consider the entire community as a unit of study in determining the health of a stream. Several useful techniques of reporting these community analyses are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01742

THE INFLUENCE OF A CHEMICAL PLANT SEWAGE SEDIMENTATION CATCHPIT ON GROUNDWATERS OF THE UPPER VISTULA FLOODPLAIN,
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
A. S. Kleczkowski, S. Kurdyka, and J. Stobierski.
Bull Acad Pol Sci Ser Sci Terre. Vol 20, No 1, p 55-59, 1972. Illus.
Identifiers: Chemicals, Chlorides, *Floodplains, Groundwater, *Poland (Upper Vistula), Pollution, *Sedimentation catchpits, *Sewage.

The substratum of catchpits is composed of peat, sand and imperviousssilty formations. Hydrochemical observations in the vicinity of catchpits (12 square km), using 120 analyses from 44 locations (piezometers and village wells), showed zonal water-pollution by chlorides and sulfates in concordance with groundwater flow direction and lowering of the impervious substratum. The range of phenol pollution was limited to 500 in from the pollution source, which is probably connected with peat absorption. Nekal pollution was still found 3 km from its source.--Copyright 1973, Biological Abstracts, Inc.
W74-01754

PREDICTION OF COPPER TOXICITY IN RECEIVING WATERS,
Environmental Protection Service, St. John's (Newfoundland).
For primary bibliographic entry see Field 05C.
W74-01775

NOTE ON BIOASSAY TRIALS ON THE EFFECT OF RAINFALL ON ACARICIDE RESIDUES,
Central Plant Protection Training Inst., Hyderabad (India).
B. K. Varma, and R. T. Gahukar.
Indian J Agric Sci. Vol 42, No 3, p 267-269. 1972.

Identifiers: *Acaricide residues, Bioassay, Dimethoate, *India, Parathion, Phaseolus-Vulgaris, Phosphamidon, Rainfall, Tetranychus-Telarius, *Mites (Red spider), *Pesticide residues, Carbophenothion.

The effect of rain on organophosphate pesticides, applied for the control of red spider mites, Tetranychus telarius L., a pest of beans, Phaseolus vulgaris L., was studied. Dimethoate and phosphamidon showed significantly lower depletion with rainfall when compared with carbophenothion and parathion, and may be the insectidies of choice during the monsoon season in India.--Copyright 1973, Biological Abstracts, Inc.
W74-01777

LARVAL DISTRIBUTION OF PARACLUNIO ALASKENSIS AT POINT PINOS SEWAGE OUTFALL, MONTEREY COUNTY, CALIFORNIA (DIPTERA, CHIRONOMIDAE),
De Anza Coll., Cupertino, Calif. Dept. of Biology.
D. T. Cheeseman Jr., and P. Preissler.
Pan-Pac Entomol. Vol 48, No 3, p 204-207. 1972, Illus.
Identifiers: *California (Monterey County), *Chironomidae, *Diptera, Distribution (Larval), Paraclunio-Alaskensis, *Sewage outfall, Outlets, *Midges.

A population of the midge Paraclunio alaskensis was studied at Point Pinos sewage outfall in Pacific Grove, Monterey Co., California. The study was made to determine the relationship of P. alaskensis larvae to the Point Pinos sewage outfall environment. A sampling method, developed to collect P. alaskensis larvae from the organic slime where they fed, included scraping entire 20 cm X 20 cm quadrants into a special collecting tray. Analysis of the population by sampling indicates that P. alaskensis larvae were abundant close to the outfall where there were large amounts of organic slime and little competition for space. The larvae decrease in number as distance from the outfall increases. A gradual decrease in organic slime and increase in marine algae and invertebrates occurred as distance from the outfall increased. It is proposed that P. alaskensis larvae may be a macroscopic indicator for human sewage pollution at freshwater rocky outfalls in a marine ecosystem.--Copyright 1973, Biological Abstracts, Inc.
W74-01779

SEASONAL VARIATIONS IN RESIDUES OF CHLORINATED HYDROCARBON PESTICIDES IN THE WATER OF THE UTAH LAKE DRAINAGE SYSTEM: 1970 AND 1971,
Brigham Young Univ., Provo, Utah. Dept. of Chemistry.
J. S. Bradshaw, E. L. Loveridge, K. P. Rippee, J. L. Peterson, and D. A. White.
Pestic Monit J. Vol 6, No 3, p 166-170. 1972, Illus.
Identifiers: *Aldrin, *BHC, *Chlorinated hydrocarbon pesticides, DDE, Drainage, Fish, Heptachlor, Lakes, *Pesticide residues, Seasonal, *Utah Lake, Water pollution sources.

Definite surges of pesticides (1 ppb or more) enter Utah Lake, 3 times per year--early spring, late spring, and fall, generally corresponding to the application times of pesticides by farmers in the area. The pesticides involved were mainly aldrin and BHC in the early spring; heptachlor (plus heptachlor epoxide) and methoxychlor in the late spring; and aldrin, heptachlor, and methoxychlor in the late fall. The fish samples collected from Utah Lakecontained only small amounts of pesticides, the highest level being 956 ppb DDE.--Copyright 1973, Biological Abstracts, Inc.
W74-01780

ENTRY OF CHEMICAL ELEMENTS--ANALOGUES (STRONTIUM-90-CALCIUM AND CESIUM-137-POTASSIUM) INTO PLANTS IN RELATION TO SOIL MOISTURE, (IN RUSSIAN),
For primary bibliographic entry see Field 02I.
W74-01783

DISSOLVED POLLUTION PRODUCT GASES IN NATURAL WATERS,
Maine Univ., Walpole. Dept. of Oceanography.
E. J. Green.
Available from the National Technical Information Service as PB-225 543/8, $3.00 in paper copy, $1.45 in microfiche. Maine Water Resources Center, Bangor Project Completion Report, August 1973. 27 p, 5 fig, 39 ref, 1 append. OWRR A-024-ME (1).

Descriptors: *Analytical techniques, *Bays, *Gases, *Sulfides, Chemical analysis, Sediments, Solubility, Estuaries, Cores, *Maine, Sedimentation, Toxicity, Oxidation, Tides, Circulation, Hydrogen sulfide.
Identifiers: *Dissolved gases, *Potentiometric titration, *Montsweag Bay (Maine).

Concern about effects of resuspension of watery deposits by increased tidal circulation upon removal of a causeway in upper Montsweag Bay, Maine prompted development of an analytical method for dissolved sulfide which avoids some problems of other procedures and yields a measure of water-soluble as contrasted with acid-soluble sulfide. Development of the sulfide antioxidant buffer allows potentiometric titrations for dissolved sulfide to be performed providing cadmium or lead rather than silver is used as titrant. Depth distribution of water soluble sulfide was determined for eight sediment cores. Concentration profiles showed one or two distinct maxima near surface, the depth to these ranging from 30 cm in slow sedimentation areas to 120 cm in rapid sediment accumulation areas. Sulfide concentrations at the maxima range from 1. to 8. moles sulfur/cu m of in situ mud. Caution should be exercised in activities like the causeway removal as the oxygen demand of surficial sediments is significant. Conservative estimated mean of 5. mole sulfide/cu m showed a mixing ratio of less than 30 volumes of oxygen saturated sea water per volume of mud will render water toxic. (Jones-Wisconsin)
W74-01786

CHEMISTRY AND APPLICATION OF ORGANOPHOSPHORUS COMPOUNDS, PROCEEDINGS OF THIRD CONFERENCE.

Available from the National Technical Information Service, $3.00 in paper copy, $1.45 in microfiche. Trans. of Khimiya ' Primeneniye Fosfororganicheskikh Soyedinen'y, Trudy 3' yey Konf., 1972, Moscow, JPRS Trans. 57825, December 1972. 147 p, 29 fig, 31 tab, 262 ref.

Descriptors: *Pesticides, *Organophosphorus compounds, *Organophosphorus pesticides, Pesticide toxicity, Pesticide kinetics, Chemical reactions, Analytical techniques, Toxicity, Inhibition, Insecticides, Formulation, Biochemistry.
Identifiers: Metathion, Phenitrothion, Complexones.

Selected papers, translated from the Russian, cover the fields of organophosphorus compounds pertaining to their chemistry, analytical techniques, metabolism in organisms and their toxicity and mechanisms. The contributions are titled: 'Conjugation in Systems With Tetrahedral Phosphorus,' 'Application of Nuclear Magnetic Resonance in Chemistry of Organophosphorus Compounds,' 'Metabolism of Organophosphorus Compounds in Animals,' 'Derivatives of Phosphacyclopentene,' 'Organophosphorus Compounds Containing a P-N-bond,' 'Anticholinesterase Properties of Certain Organophosphorus Compounds,' 'On the Interaction Between Organophosphorus Inhibitors and Cholinesterase,' 'Certain Problems in Quantitative Toxicology of Organophosphorus Compounds,' 'Metathion--A New Lowtoxicity Organophosphorus Insecticide,' and 'Experimental Investigations of the Biological Activity of Organophosphorus Complexones.' (See W74-01788 thru W74-01797) (Auen-Wisconsin)
W74-01787

CONJUGATION IN SYSTEMS WITH TETRAHEDRAL PHOSPHORUS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
M. I. Kabachnik.
In: Chemistry and Application of Organophosphorus Compounds Proceedings of Third Conferences Trans. from Russian; JPRS Translation 57825, December 1972. p 1-28, December 1972. 5 fig, 97 ref.

Descriptors: *Organophosphorus compounds, Organophosphorus pesticides, Chemical reactions, Chemistry, Molecular structure.

The question concerning the participation of phosphorus atoms in a conjugation chain and their capacity to transfer electron influences from one part of a molecule to another is related to a more general question concerning the participation of the d-orbit of phosphorus in the formation of chemical bonds. In conjugate systems with the tetrahedral phosphorus atom, located at the end of the chain, it may participate in the conjugation to the extent of formation of 3d-sub-pi -2p-sub-pi-bonds. The energy effect of this conjugation is minor and the structure of the compounds is closer to phosphonium or phosphoryl than to the alternative with phosphinomethylene bond, but the effect of conjugation nevertheless clearly influences the chemical and optical properties of the compounds. The importance is in the substantial difference that in purely carbon conjugate systems the displacement of charges (+T-effect) occurs within a single chromophore, and during reactions of organophosphorus conjugate systems there occurs electrometric transfer of charge from one chromophore to another. It is here, in view of participation of 3d-sub-pi-2p-sub-pi pi-bonds of phosphorus that the effect is usually minor and conjugation is weak. (See also W74-01787) (Auen-Wisconsin)
W74-01788

APPLICATION OF NUCLEAR MAGNETIC RESONANCE IN CHEMISTRY OF ORGANOPHOSPHORUS COMPOUNDS,
Akademiya Nauk SSSR, Moscow. Institut Organicheskoi Khimii; and Kazan Inst. of Chemical Technology (USSR).
Yu. Yu. Samitov, and T. V. Zykova.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans from Russian Joint Publications Research Service Report 58725, p 29-63, December 1972. 7 fig, 5 tab, 55 ref.

Descriptors: *Organophosphorus compounds, *Analytical techniques, *Chemistry, Spectroscopy, Molecular structure, Phosphorus.
Identifiers: *Nuclear magnetic resonance, Double nuclear magnetic resonance.

High-resolution nuclear magnetic resonance spectroscopy (NMR) has become one of the most important physical methods of analyzing the structure of organic compounds. The resonance of the phosphorus P-31 nucleus also contains a wealth of information about the chemical environment of phosphorus and the nature of chemical bonds between phosphorus and atoms combined with it. In analyzing the final organophosphorus compounds synthesis products organic chemists are aided by a knowledge of the physical constants, IR-spectra and NMR spectra of the proton and

chemical shifts of P-31 nuclei. Chemical shifts is one of the most important parameters of the NMR-spectrum. The application of nuclear magnetic resonance in organophosphorus chemistry is described. (See also W74-01787) (Auen-Wisconsin)
W74-01789

METABOLISM OF ORGANOPHOSPHORUS COMPOUNDS IN ANIMALS,
Leningradskii Meditsinskii Institut (I) (USSR).
V. I. Rozengart.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 64-75, December 1972.

Descriptors: *Organophosphosphorus compounds, *Metabolism, *Epizootiology, Biochemistry, Toxicity, Chemical properties, Chemical reactions.
Identifiers: *Metabolic transformations, Selective toxicity, Fermentative transformation, Detoxification, Anticholine esterase activity.

Chemical conversions experienced by organophosphorus compounds (OPC) during metabolism usually determine the selective toxicity of these compounds and a thorough knowledge of OPC reactions in the body is essential for the synthesis of new compounds with predetermined properties. The present incomplete information evidences an extreme variety of OPC metabolic transformations as paths of fermentative transformation. The possibility of artificially influencing the activity of OPC-metabolizing ferments, i.e., depressing or enhanching their action is of great practical importance. Aldrine and certain chlorinated hydrocarbons activate many esterases, thereby strenghening the hydrolysis and consequently the detoxification of OPC. Extensive investigation of the activators and inhibitors of ferments that metabolize OPC may serve as the foundation for development of prophylactic methods and therapy of OPC poisoning, and also of selectively increasing toxicity for insects. The question as to what is the source of ferments in animal organisms that act on compounds that are not only completely foreign to the organism, but also are absent in nature under natural conditions is answered by a hypothesis--the reaction products are always more polar and less lipid-soluble than the original compounds--a view that illustrates why many metabolic OPC transformations lead to the formation of more toxic products. (See also W74-01787) (Auen-Wisconsin)
W74-01790

DERIVATIVES OF PHOSPHACYCLOPENTENE,
Akademiya Nauk SSR, Kazan. Inst. of Organic and Physical Chemistry.
B. A. Arbuzov, A. O. Vizel, M. A. Zvereva, K. M. Ivanovskaya, and Yu. Yu. Samitov.
In: 'Chemistry and Application of Organophosphorus Compounds' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 76-85, December 1972. 4 fig, 2 tab, 19 ref.

Descriptors: *Organophosphorus compounds, *Chemical properties, Chemical reactions, Toxicity, Lethal limit, Chemistry.
Identifiers: *Phosphacyclopentene, Phospholene, Drugs.

McCormack's discovery (1953) of a reaction between alkyl- and arylidhalogen phosphines and 1,3-dienes led to the establishment of two new P-C bonds. Analysis of this reaction led to the discovery (1959) that the aryl- and alkyldihalogen phosphites are also capable of reacting with dienes which made it possible to synthesize arylphosphinates with the phospholene cycle. Continued analysis of reactions between trivalent phosphorus compounds and conjugate systems indicated that the dienes are bonded not only halides of organic compounds of trivalent phosphorus, but also phosphorus trichloride and phosphorus tribromide. Because trihalogen phosphoranes are extremely reactive compounds they can be synthesized into various phosphacyclopentene derivatives. The insecticidal activity of the compounds is manifested only at high concentrations. Their toxicity for warm-blooded animals is low. The injection of the compounds caused experimental animals to go into a narcosis state which was reversible. Since the symptoms of poisoning with derivative of phospholene resemble those of narcotics, analysis of their interaction with corazole, a typical narcotics antagonist was made. The effect of the prophylactic injection of a dose of certain phosphlene derivatives on the effect of a lethal dose of corazole was determined. Several phospholene derivatives have a bactericidal effect on certain forms of pathogenic microbes. (See also W74-01787) (Auen-Wisconsin)
W74-01791

ORGANOPHOSPHORUS COMPOUNDS CONTAINING A P-N-BOND,
Gosudarstvennyi Nauchno-Issledovatelskii i Proektnyi Institut Azotnoi Promyshlennosti i Produktov Organicheskogo Sinteza, Moscow (USSR).
V. P. Yevadakov, L. I. Mizrakh, Ye. K. Shlenkova, and L. Yu. Sandalova.
In: 'Chemistry and Application of Organophosphorus Compounds', Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 86-92. December 1972. 1 tab, 5 ref.

Descriptors: *Organophosphorus compounds, *Chemistry, Chemical reactions, Chemical properties.
Identifiers: *P-N bond, Aminophosphoranes, Phospholene cycle, Acid anhydrides.

Reported are the results of investigations of several questions concerning the chemistry of organophosphorus compounds containing a P-N bond by way of example of compounds of trivalent and pentavalent phosphorus. The specific subject investigated was aminophosphoranes with the phospholene cycle, which are easily synthesized by reacting amidophosphites with alpha-diketones, using diacetyl or cyclo-hexandedione. Analysis of the chemical properties of aminophosphoranes with the reactions of hydrolysis and alcoholysis was the start of establishing that hydrolysis is an oxothermic reaction involving the splitting off of amine and the formation of 2-oxoalkyldialkyl phosphates. The properties of the compounds produced by reacting aminophosphoranes with acid anhydrides are listed. Even within the framework of the reported investigation it is obvious that compounds containing a P-N bond, with phosphorus in the tri- and pentavalent state, are of considerable importance and exhibit tremendous synthetic possibilities. (See also W74-01787) (Auen-Wisconsin)
W74-01792

ANTICHOLINESTERASE PROPERTIES OF CERTAIN ORGANOPHOSPHORUS COMPOUNDS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
N. N. Godovikov.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 93-103. December 1972. 3 fig, 5 tab, 15 ref.

Descriptors: *Organophosphorus pesticides, *Organophosphorus compounds, *Animal physiology, *Inhibitors, Enzymes, Pesticide toxicity, Chemistry, Biochemistry.
Identifiers: *Organophosphorus inhibitors, Antichloine esterase.

Among the organophosphorus inhibitors (OPI) of choline esterases the thiol derivatives of theiophosphoric and thiophosphonic acids, containing in the beta-position of the bioester radical a heteroatom (sulfur or nitrogen), are of great importance. These include chiefly compounds of the isosystox type and the 'temmeline' preparations. It is known that when acetylcholine reacts with choline esterase the first occurrence is the sorption of acetylcholine as a result of its trimethyl ammonium grouping on the anionic center of the ferment. This creates conditions favorable for the subsequent reaction of acetylcholine with the esterase center, with the result that the hydroxyl of the serin link of the polypeptide chain of the ferment is acetylated. The acetylated ferment is then hydrolyzed by water, producing acetic acid, choline and the activity of the choline esterase is restored. In the first stages choline esterase reacts also with OPI, carrying a positive charge in the thioester radical; the phosphorylated ferment, however, reacts very slowly or not at all with water. Results show that in the presence of a whole positive charge in the heteroatom in the beta-position of the thioester radical the polar and steric effects of the substituents in the phenyl nucleus have little influence on the anticholine esterase activity of OPI. (See also W74-01787) (Auen-Wisconsin)
W74-01793

ON THE INTERACTION BETWEEN ORGANOPHOSPHORUS INHIBITORS AND CHOLINESTERASE,
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Physiology.
A. P. Brestkin, I. L. Brik, R. I. Volkova, Ye. V. Rozengart, and A. A. Sagal.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 104-113. December 1972. 3 fig, 5 ref.

Descriptors: *Pesticide kinetics, *Organophosphorus pesticides, *Organophosphorus compounds, *Inhibitors, Chemistry, Carbamate pesticides, Pesticide toxicity, Mathematical studies, Biochemistry.
Identifiers: *Anticholine esterase.

According to current concepts, the reaction of ferments (choline esterases, trypsins, chymotrypsins) with irreversible inhibitors, such as organophosphorus compounds and carbamates, proceeds in two states. This interaction is a variety of consecutive reactions, the kinetics of which were developed in general form by Racovsky. A method of mathematical analysis of the reaction kinetics by formula was applied to experimental data obtained in the laboratory using synthesized preparations. (See also W74-01787) (Auen-Wisconsin)
W74-01794

CERTAIN PROBLEMS IN THE QUANTITATIVE TOXICOLOGY OF ORGANOPHOSPHORUS COMPOUNDS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
Yu. S. Kagan, M. A. Klisenko, and T. N. Pan'shina.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 114-128. December 1972. 5 fig, 5 tab, 24 ref.

Descriptors: *Organophosphorus compounds, *Organophosphorus pesticides, *Pesticide toxicity, *Analysis, Industries, Agriculture, Formulation, Hazards, Public health, Toxins, Lethal limit, Volatility, Acaricides.
Identifiers: *Toxicology, Choline esterase.

The high biological activity of many organophosphorus compounds, and their extensive utilization in industry, agriculture and medicine, necessitates investigation of their toxicology. In toxicology, the establishment of quantitative relationships is complex since the effect of compounds depends substantially on the rate of ingestion, character of distribution and their accumulation in the body, and rate and character of metabolic reactions. Integral toxicity coefficients more completely reflect the differences in toxic properties than the value LD-50. The real hazard of OPC is not only their absolute toxicity (biological activity), but also their capacity to invade the body chiefly through the respiratory system and healthy skin. The so-called effective (two-phase) toxicity, representing the product of toxicity and volatility is used to characterize the risk of a drug entering the body through the respiratory tract. Data on the cumulative coefficients of certain organophosphorus insecticides are presented for warm-blooded animals and insects. The comparatively weak cumulative properties of many OPC distinguish these compounds and makes it extremely promising from the health standpoint to find low-toxic pesticides from among this group. Since many OPC are not only rendered harmless in the animal organism, but also converted to more active anticholine esterase compounds, changes in the anticholine esterase activity were anlyzed. (See also W74-01787) (Auen-Wisconsin)
W74-01795

METATHION--A NEW LOW-TOXICITY ORGANOPHOSPHORUS INSECTICIDE,
Vyzkumny Ustav Agrochemickej Technologie, Bratislava (Czechoslovakia).
S. Trukhlik, I. Drabek, I. Kovach, and S. Gager.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans from Russian Joint Publications Research Service Report 58725, p 129-138, December 1972. 6 tab, 35 ref.

Descriptors: *Organophosphorus compounds, *Organophosphorus pesticides, *Insecticides, *Toxicity, Formulation, Patents, Birds, Mammals, Analytical techniques, Pesticide residues, Mode of action, Agriculture, Animal parasites, Domestic animals.
Identifiers: *Metathion, *Toxicology, Chlorothione, Osoclorothione, Dicaptone.

On the assumption that molecules have a three-dimensional structure and on data that in many biologically active compounds a chlorine atom can be replaced by a methyl group, O,O-dimethyl-O-(3-methyl-4-nitrophenyl) thiophosphate is the contribution to the synthesis of organophosphorus compounds with low toxicity for warm-blooded animals. Although the differences in toxicity in animals were not surprising, the insecticidal properties of metathion are remarkable. Based on data on the insecticidal and toxicological properties of metathion and a check of its capabilities, a method for its production and application was patented. Metathion is produced by reacting O,O-dimethylchlorothiophospate with alkali salt of 3-methyl-4-nitrophenol or with 3-methyl-4-nitrophenol in the presence of compounds that bond hydrogen chloride. Analytical methods for determining its residues are described. Its comparatively low toxicity to warm-blooded animals is attributed to its capacity to be transformed readily in the organism to less toxic compounds and to the fact that the oxygen analog of metathion is a weaker inhibitor of chloine esterase than paraoxone or methylparaoxone. Metathion is extremely difficult to absorb. It is particularly recommended for combatting flies, cockroaches, mosquitoes, other insects, and farm animal parasites. Its effect against three forms of barn pests were eclipsed only by phenitrothion of 46 insecticides tested. (See also W74-01787) (Auen-Wisconsin)
W74-01796

EXPERIMENTAL INVESTIGATIONS OF THE BIOLOGICAL ACTIVITY OF ORGANOPHOSPHORUS COMPLEXONES,
Institut Gigieny Truda i Professionalnykh Zabolevanii, Moscow (USSR).
O. G. Arkhipova, N. K. Demokidova, T. Ya. Medved, and M. V. Rudomino.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 139-147. December 1972. 3 fig, 4 tab, 9 ref.

Descriptors: *Organophosphorus compounds, *Human diseases, *Toxins, Chelation, Chemicals, Biochemistry, Metals, Trace elements, Metabolsim.
Identifiers: *Complexones, *Medicine, *Pharmacology, Aminoalkylpolyphosphonic acids, Aminopolycarboxylic acids.

The capacity of chelating compounds to form with metals strong intracomplex hydrophilic compounds stimulated the extensive application of complexones in biology and medicine. Information about certain aspects of the effect of aminoalkylpolyphosphonic acids on biological specimens compared with aminopolycarboxylic acids is presented. The importance of the influence of chelating compounds on the elimination of trace elements from the body and the state of the metal complexes present in the body is stressed. The described reactions between complexones and body bio-complexes can be examined from the standpoint of competition between addends for metal. In the case when a complexone acts on metal which is unstably bonded in the biocomplex, as is the case in glycyl-glycine dipeptidase, the metal can be displaced from the biocomplex and its functions destroyed. The data presented are evidence for the fact that organophosphorus complexones are potent agents for the elimination of several toxic metals from the body. They have a number of features in comparison with aminopolycarboxylic complexones. Moreover the mechanism for biological action of these two series of complexones has general features, since during complexone therapy in the organism complex interaction occurs between internally introduced complexones and the biocomplexes. (See also W74-01787) (Auen-Wisconsin)
W74-01797

NUTRIENTS IN NATURAL WATERS.
For primary bibliographic entry see Field 05C.
W74-01798

NITROGEN: SOURCES AND TRANSFORMATIONS IN NATURAL WATERS,
Florida Univ., Gainesville. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 05C.
W74-01799

PHOSPHORUS: ANALYSIS OF WATER, BIOMASS, AND SEDIMENT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 05C.
W74-01800

THE CARBON CYCLE IN AQUATIC ECOSYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05C.
W74-01801

NUTRIENT SUBMODELS AND SIMULATION MODELS OF PHYTOPLANKTON PRODUCTION IN THE SEA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W74-01804

DETERGENT DEVELOPMENTS AND THEIR IMPACT ON WATER QUALITY,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
For primary bibliographic entry see Field 05C.
W74-01807

AN APPROACH TO THE MODELING OF LAKES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
C. R. O'Melia.
Schweiz Z Hydrol, Vol 34, No 1, p 1-33, 1972, Illus.
Identifiers: Lakes, *Mathematical studies, *Model studies, Water quality.

An approach to the development of predictive models for water quality in lakes is presented. Attention is directed primarily towards lake depth and nutrient loading. Mathematical models pertaining to particular problems are provided.--Copyright 1973, Biological Abstracts, Inc.
W74-01819

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-01852

INDEX OF TIME-OF-TRAVEL STUDIES OF THE U.S. GEOLOGICAL SURVEY,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 02E.
W74-01874

WATER QUALITY IN THE CONSERVATION AREAS OF THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT, 1970--72,
Geological Survey, Tallahassee, Fla.
B. F. McPherson.
Open-file report 73014, 1973. 39 p, 5 fig, 16 tab, 4 ref.

Descriptors: *Water quality, *Surface waters, *Florida, *Pollutant identification, *Path of pollutants, Chemical analysis, Dissolved solids, Pesticides, Correlation analysis, Water levels, Drouthts, Rainfall, Sampling, Bottom sediments, Fish, Water analysis, Nutrients, Nitrogen, Phosphorus.
Identifiers: Conservation areas.

Selected chemical indicators of water quality in and near the conservation areas in southern Florida in 1970-72 varied with location and season. Dissolved solids generally were highest in the north and northeast where averages ranged from 471 to 641 mg/liter and lowest in the south and west where averages ranged from 172 to 387 mg/liter. Pesticides showed a similar distribution trend. The DDT family (the most commonly detected pesticide) averaged 192 micrograms/kg in bottom sediments in the north of the areas compared with 13.8 micrograms/kg in the south. DDT averaged 723 micrograms/kg in centrarchid fish (bass and sunfish in the north and 264 micrograms/kg in the south. Highest concentrations of polychlorinated biphenyls (PCB's) in bottom sediments were 1,300 and 1,900 micrograms/kg. Concentrations of nitrogen and phosphorus varied more with season or water level than with location. They were highest in June 1971, at the end of a drought; average values were 1.6 mg/liter inorganic N (compared with 0.13 to 0.48 mg/liter at other times), 4.0 mg/liter organic N (compared with 0.8 to 2.5 mg/liter at other times), and 0.05

mg/liter as P (compared with 0.01 to 0.04 mg/liter at other times). (Woodard-USGS)
W74-01881

NUTRIENT CONTENT OF BARNLOT RUNOFF WATER,
Agricultural Research Service, Coshocton, Ohio. Soil and Water Conservation Research Div.
W. M. Edwards, E. C. Simpson, and M. H. Frere.
J Environ Qual. Vol 1, No 4, P 401-405. 1972. Illus.
Identifiers: Cattle, Minerals, Nutrients, *Ohio, Runoff, Seasonal, Water pollution sources, *Farm wastes, *Feed lots.

From March 1968 through Dec. 1970, runoff from a 60-head beef cattle barnlot in Ohio was measured and concentrations of nitrate, total N, P, and K in solution were determined. Nitrate-nitrogen concentration was < 2 mg/l for 8 mo. of the year, with the highest monthly concentration 6 mg/l. Most of the soluble N was in a reduced form with the maximum monthly concentration < 70 mg/l. P concentration was < 5 mg/l during the spring and early summer, with a peak near 14 mg/l in Sept. Monthly K concentration was always < 100 mg/l with peak values > 300 mg/l. Nitrate concentration was highest during warm months when environmental conditions favored oxidation. Concentration of all other nutrient forms decreased during the summer when the barnlot was not being used by cattle. Copyright 1973, Biological Abstracts, Inc.
W74-01890

ARSENIC CONTENT OF FISH FROM NEW YORK STATE WATERS,
Cornell Univ., Ithaca, N.Y. Pesticide Residue Lab.
For primary bibliographic entry see Field 05C.
W74-01900

BIOLOGICAL INCRUSTATION OF WELLS DUE TO MASS DEVELOPMENT OF IRON AND MANGANESE BACTERIA,
Bundesgesundheitsamt, Berlin (West Germany). Institut fuer Wasser-, Boden-, und Lufthygiene.
U. Haesselbarth, and D. Luedemann.
Water Treat Exam. Vol 21, No 1, p 20-29. 1972. Illus.
Identifiers: Bacteria, *Biological incrustation, *Iron bacteria, *Manganese bacteria, *Wells.

Photographic inspection indicated that mineral encrustation results from: hydrated Fe and Mg oxides excreted from masses of Fe and Mg bacteria; general metallic corrosion; and chemical/physical features of well water. Also, SO4-2 reducing bacteria might possibly induce FeS deposits. Bacterial colonies on glass slides suspended in wells were microscopically examined, from which significant chemical factors in the well water were evaluated. Conditions conductive to mass Fe and Mg bacteria growth (and subsequent mineral deposition) were: presence of the bacteria; minimum ion concentrations, e.g., 16 mg/l Fe+2 (standing water) or 1.6 mg/l Fe+2 (flowing water; and increased oxidation reduction potential.--Copyright 1973, Biological Abstracts, Inc.
W74-01902

WATER QUALITY AND WASTE ASSIMILATIVE CAPACITY OF THE PEARL RIVER BELOW BOGALUSA, LOUISIANA,
Geological Survey, Baton Rouge, La.
D. E. Everett, L. D. Fayard, and F. C. Wells.
Louisiana Department of Public Works Water Resources Technical Report No 7, 1973. 28 p, 16 fig, 2 tab, 7 ref.

Descriptors: *Water quality, *Waste assimilative capacity, *Self-purification, Rivers, *Louisiana, Water pollution sources, Municipal wastes, Industrial wastes, Streamflow, Flow rates, *Biodegradation, Biochemical oxygen demand, *Dissolved oxygen, Organic matter, Model studies, Data collections, Correlation analusis.
Identifiers: *Pearl River (La), Bogalusa (La).

The Pearl River downstream from Bogalusa, La., receives wastes from municipal and industrial sources that are equivalent to approximately 30 tons per day of biochemical oxygen demand. The river has an average discharge of 8,500 cfs but cannot assimilate the present biodegradable waste load during low-flow conditions. The concentration of dissolved solids is less than 60 mg per liter 90% of the time, and the occurrence of minor elements is presently not a problem. The pH of the water, which is generally less than 7.0, would be noticeably affected by the discharge of large amounts of acidic or basic wastes, especially during low-flow periods. The disposal of bacteria-laden wastes into the river causes it to be unsafe for primary contact water-recreation uses during low-flow. The effect of biodegradable wastes on the river quality is also emphasized by the drastic changes in the macroinvertebrate communities in the river from above the outfall to Walkiah Bluff. For example, clean-water organisms are present at Bogalusa, absent at Pools Bluff, and present again in Walkiah Bluff. The one-dimensional, mathematical dissolved-oxygen model that relates organic-waste loads to dissolved-oxygen concentration can be used to predict the effect of biodegradable waste on the oxygen concentrations in the river. (Woodard-USGS)
W74-01922

SIGNIFICANCE OF CELLULOSE PRODUCTION BY PLANKTONIC ALGAE IN LACUSTRINE ENVIRONMENTS,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 05C.
W74-01927

A METHODOLOGY FOR DETERMINING OPTIMAL LONGITUDINAL SPACING OF EFFLUENT DISCHARGES INTO A RIVER,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
R. Deacon, and R. J. Giglio.
Available from the National Technical Information Service as PB-225 698 $9.00 in printed copy, $1.45 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication No. 22, 1971. 131 p, 16 fig, 17 tab, 38 ref. OWRR B-011-MASS (9).

Descriptors: Water pollution sources, *Mathematical studies, *Outlets, *Cost analysis, Data processing, Dissolved oxygen, Biochemical oxygen demand, *Dispersion, Mixing, Waste water treatment, Water quality control, Effluent streams, *Optimal development plans.
Identifiers: *Stream assimilative capacity, Algorithms, Effluent discharges.

The consequence on cost and water quality of discharging waste-water effluent through outfalls spaced along a river is examined. Compared to the conventional one-outfall case the effluent from a plant discharging through several outfalls can be of lower quality and still not violate stream standards. Thus the reduced cost of treatment can compensate for the added cost of the more elaborate transport system. A model of the stream characteristics based on the Camp-Dobbins equations was combined with a model representing the costs of water treatment and disposal. An algorithm has been developed and programmed to find the minimum cost configuration for any set of water and economic conditions. The level of sophistication of this model should be sufficient to justify its use in actual planning situations and consequently special attention is given to specifying the data required for its use. Results of test runs using realistic data indicate that using multiple outfalls often provides improved stream quality at reduced cost. This is true whether minimum dissolved oxygen, average dissolved oxygen or combination of the two are used as measures of stream quality. Results also indicate that a multiple outfall system is less sensitive to increases in BOD loadings caused by a growing population.
W74-01928

HEAT AND WATER VAPOR EXCHANGE BETWEEN WATER SURFACE AND ATMOSPHERE,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 02D.
W74-01930

MEASUREMENTS PROGRAM FOR OIL-SLICK CHARACTERISTICS--FINAL REPORT,
Michigan Univ., Ann Arbor. Willow Run Labs.
R. Horvath, W. L. Morgan, and R. Spellicy.
Available from NTIS, Springfield, Va 22151 AD-758 591 Price $6.00 printed copy; $1.45 microfiche. Final Report 2766-7-F, February 1970. 179 p, 110 fig, 13 ref, 2 append. DOT-CG-92580-A.

Descriptors: *Water pollution sources, *Oil spills, *Path of pollutants, *Remote sensing, *Spectroscopy, Light, Reflectance, Refractivity, Fluorescence, Mathematical models, Evaluation.
Identifiers: *Oil-slick detection.

Summarized are results of a laboratory investigation utilizing the spectral region from the ultraviolet to the infrared for determining oil-slick characteristics. Included are data obtained from measurements of absorptance, index of refraction, emissivity, and fluorescence for a variety of crude oils and petroleum products. A mathematical model is developed for using these quantities to determine the spectral radiance from oil films on smooth water in an outdoor environment. Conclusions are discussed and recommendations are made for future work to apply these results to the selection, design and evaluation of remote sensing for oil-slick detection. (Woodard-USGS)
W74-01941

MATHEMATICAL SIMULATION OF SALINITY IN THE SACRAMENTO ROVER SYSTEM,
California State Dept. of Water Resources, Sacramento.
J. C. Mosley.
Available from State of Calif, Documents Section, P.O. Box 20191, Sacramento, Calif 95820 Price $2.00. Bulletin No 156, August 1971. 72 p, 21 fig, 12 tab, 27 ref, 3 append.

Descriptors: *Streamflow forecasting, *River basins, *Salinity, *Water quality, *California, *Mathematical models, Equations, Data collections, Electrical conductance, Correlation analysis, Tributaries, Inflow, Reservoirs, Reservoir releases, Discharge (water), Municipal wastes, Industrial wastes, Analytical techniques, Projections, Water supply.
Identifiers: *Sacramento Valley (Calif).

The Sacramento Valley, California, Water quality model simulates mathematically the monthly flow-weighted mean electrical conductivity (EC) by reaches in the Sacramento River system. Using readily available flow and EC data, the model was developed around the system's three general types of flow: unregulated tributary inflow; reservoir impoundments and releases; and valley floor accretions or depletions. The latter was further broken down into storm-water runoff, irrigation return flow, municipal and industrial waste discharges, diversions of streamflow for beneficial use, weir spills, and unmeasured inflows and losses. Flow and EC data for all inflows, diversions and other losses were combined in a series of equations in which mean monthly EC was

weighted with quantities of flow. Model outputs were flowweighted mean EC in micromhos, salt loading in tons and corresponding rates of streamflow in acre-feet at 12 locations in the system for each month of a selected time period. The model was verified by comparing computed EC values with prototype values at selected river stations. The model was used to estimate the probable future EC at each station in the system under a projected 1990 level of development. Results showed an increase in flow-weighted average EC, but no monthly values were great enough to threaten any beneficial uses of the Sacramento River. (Woodard-USGS)
W74-01944

ACIDOPHILIC THIOBACILLI IN THE RIVER SIRPPUJOKI,
Helsinki Univ. (Finland). Dept. of Microbiology.
S. I. Niemela, and O. H. Touvinen.
J Gen Microbiol. Vol 73, No 1, p 23-28. 1972. Illus.
Identifiers: *Finland (River Sirppujoki), Rivers, *Thiobacilli (Acidophillic), *Iron bacteria.

Numbers of acidophilic thiosulfate-oxidizing and iron-oxidizing thiobacilli in the River Sirppujoki (SW Finland) were monitored through one annual cycle. A number of physical and chemical environmental variables of the river water were determined (temperature, discharge, pH values, titratable acidity, and concentrations of Mn, Fe and sulfate). Thiobacilli in river water appeared mainly to have been washed in from the soil. Once in the river a slow loss of viability occurred, strongly influenced by the temperature. The methods for quantitative colony counts of acidophilic thiobacilli were deemed unsatisfactory.--Copyright 1973, Biological Abstracts, Inc.
W74-01946

BASIC DIRECTIONS OF SCIENTIFIC INVESTIGATIONS IN THE PROTECTION OF SURFACE WATERS FROM POLLUTION (OKHRANA POVERKHNOSTNYKH VOD OT ZAGRYAZNENIYA (OSNOVNYYE NAPRAVLENIYA NAUCHNYKH ISSLEDOVANIY)),
Akademiya Nauk SSSR, Moscow, Institut Vodnykh Problem.
O. T. Bolotina, and I. P. Kanardov.
Vodnyye Resursy, No 3, p 53-64, 1972.

Descriptors: *Water quality control, *Water pollution control, *Water pollution sources, *Water pollution effects, *Surface waters, Agricultural chemicals, Fertilizers, Industrial wastes, Waste water treatment, Eutrophication.
Identifiers: *USSR.

Sources of pollution of natural waters and their effects on water quality of open bodies of water are discussed. Measures which will help stop pollution of the water medium are analyzed, and attention is focused on the need to apply a complex of measures to control water pollution sources and water quality. Five basic directions of investigations are proposed: (1) reduction or elimination of pollution sources: (2) improvement of industrial techniques of wastewater treatment; (3) utilization of natural conditions to restore the quality of waters containing residual contaminants; (4) investigation and development of methods to control water-quality characteristics of natural bodies of water; and (5) improvement of water-quality estimates in connection with man's activities. (Josefson-USGS)
W74-01967

SUBSURFACE QUALITY TRANSFORMATIONS DURING THE INITIATION OF A NEW STABILIZATION LAGOON,
Arizona Univ., Tucson. Water Resources Research Center.
For primary bibliographic entry see Field 05D.
W74-01972

SOME NATURAL PHYSICAL PROCESSES AFFECTING THE RECOVERY OF THE GREAT LAKES,
Ohio State Univ., Columbus.
T. Y. Li.
In: Proceedings 19th Annual Technical Meeting, 'Realism in Environmental Testing and Control' April 2-5, 1973, Anaheim, California, p 416-423, 1973. OWRR X-117 (No 3724) (2).

Descriptors: *Self-purification, *Pollutants, *Distribution patterns, Physical properties, *Great Lakes, Heat budget, Flow, Stratification, Thermodynamics, Mathematical studies, Mixing, Currents (Water), Circulation, Dispersion, Waves (Water), Turbulence, Sedimentation.

Important physical processes affecting self-improvement of the Great Lakes include natural flow with removal time estimate, temperature distribution, transport and mixing by wind (circulation, Coriolis effects, and dispersion of contaminants, waves, windrows, seiches), and sedimentation. The addition of new influent materials constitutes a perturbation on the thermodynamic state of the lake in such a manner that is will tend towards a new thermodynamic state by a relaxation process. A pollution abatement potential concept is introduced on the basis of a non-linear kinetic equation. Results of some theoretical studies tend to suggest that the thermal body force does play an important role in generating the mean lake circulation pattern. The energy inputs into the lake that are largely responsible for mixing and movement of its water, directly or indirectly, are the thermal forces. For the study of water transport and mixing, effects of geometrical constraint of the lake basin and the effects of inflow into and outflow from the lake are considered. The sediment, besides recording significant changes in the drainage basin, also plays an important role in the lake's metabolism. Water turbidity is largely an indicator of the amount of suspended particles. (Jones-Wisconsin)
W74-01974

MERCURY POLLUTION OF LAKE ERIE ECOSPHERE,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
K. K. S. Pillay, C. C. Thomas, Jr., J. A. Sondel, and C. M. Hyche.
Environ Res. Vol 5, No 2, p 172-181. 1972. Illus.
Identifiers: Algae, Brain, *Ecosphere, Fish, Human, Lakes, *Mercury, Plankton, Pollution, *Neutron activation analysis, *Lake Erie.

The distribution of Hg in the ecosphere of Lake Erie was monitored with a highly sensitive and reliable neutron activation analysis procedure. A variety of samples from the fauna and flora of the lake as well as those from its immediate environment were analyzed for their Hg content. The results indicate a widespread distribution of Hg in air particulates; coal samples of the region; sediments, plankton/algae and fish samples from the lake; and in the brain tissues of long-time residents of the Lake Erie Basin.--Copyright 1973, Biological Abstracts, Inc.
W74-01985

EROSION OF AZINPHOSMETHYL FROM APPLE LEAVES BY RAIN AND OVERTREE IRRIGATION,
Department of Agriculture, Summerland (British Columbia). Research Station.
A. D. Mc Mechan, V. G. Morgan, and G. A. Wardle.
J Entomol Soc B C. 69: p 5-8. 1972. Illus.
Identifiers: *Apple leaves, *Azinphosmethyl, Erosion, *Irrigation (Overtree), Laspeyresia-Pomonella, Rain, Moth control.

Three sprays of azinphosmethyl wettable powder were applied for seasonal control of the codling moth, Laspeyresia pomenella (L.), in a semi-dwarf apple orchard. A rain of 1.75 cm, occurring 6 hr after a spray application, removed 41% of the deposit from the leaves; a rain of 1.00 cm, occurring 16 days after an application, did not remove any residue. Residues in the treetops were eroded more rapidly in blocks with overtree irrigation than in those with undertree irrigation. But there was no difference in the erosion rate in the overtree-irrigated orchard whether 5.1 cm of water was applied biweekly or 2.5 cm was applied weekly. There was a trend to poorer control of the codling moth with overtree irrigation.--Copyright 1973, Biological Abstracts, Inc.
W74-01992

UREA AND OTHER NITROGENOUS NUTRIENTS IN LA JOLLA BAY DURING FEBRUARY, MARCH AND APRIL 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. J. Mc Carthy, and D. Kamykowski.
U S Natl Mar Fish Serv Fish Bull. Vol 70, No 4, p 1261-1274. 1972. Illus.
Identifiers: Bays, *California (La Jolla Bay), Chlorophyll, *Nitrogenous compounds, Nutrients, Phaeo, Pigments, Prionace-Glauca, *Urea, *Blue shark infection.

Samples collected from La Jolla Bay California, twice weekly for 2 1/2 mo. were analyzed for nitrate, nitrite, ammonium and urea in addition to other chemical, physical, and biological parameters. On the basis of an infestation of blue sharks (Prionace glauca), periods before, during and after the infestation were defined. Statistical analyses indicated that urea concentrations were highest during the period of shark infestation. There was strong positive correlation between phaeo-pigment/chlorophyll ratios and ammonium concentrations during the infestation but none between the pigment ratios and either the ammonium concentrations for the other 2 periods or the urea concentrations for any of the 3 periods. There was no correlation between ammonium and urea concentrations before, a strong positive correlation during, and no correlation after the shark infestation. Urea was the only nitrogenous nutrient for which the concentrations above and below the thermocline were not different. Comparisons between 2 stations 1.5 km distant indicate that on a horizontal scale, the patch structure for urea is smaller than that of the other nitrogenous nutrients although the median urea concentration in the water column was not different at the 2 stations. The temporal similarity and the more complex patch structure for urea suggest that the blue sharks were responsible for the higher urea concentrations during the infestation. Although the median ammonium concentrations before and during the infestation were not different, the strong positive correlation between ammonium and urea concentrations during the infestation hint that the sources or rates of supply and utilization for both nutrients may have been closely related. The strong positive correlation between phaeo-pigment/chlorophyll ratios and ammonium concentrations during the infestation may imply that the source of ammonium was herbivore excretion.--Copyright 1973, Biological Abstracts, Inc.
W74-01993

ENVIRONMENTAL POLLUTION, A SURVEY EMPHASIZING PHYSICAL AND CHEMICAL PRINCIPLES,
Iowa State Univ., Ames. Dept. of Physics.
L. Hodges.
Holt, Rinehart and Winston, Inc., New York, N.Y., 1973. 370 p. $7.95.

Descriptors: *Environmental effects, Pollutants, *Water pollution sources, Industrial production, Biology, Biomass, Ecology, Economics, Food chains, Population, *Radioactivity effects, *Cost-benefit ratio, Projections, Pesticide toxicity, *Toxicity, Public health.

An introduction is presented to the important subject of environmental pollution. There is considerable feeling today that we must press scientific development to eliminate pollution for our survival. Environmental pollution is the unfavorable alteration of our surroundings, wholly or largely as a by-product of man's actions, through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organisms. These changes may affect man directly or through his supplies of water and of agriculture and other biological products, his physical objects or possessions, or his opportunities for recreation and appreciation of nature. An important tool in pollution assessment, the benefit-vs-cost concept, is considered. (Houser-ORNL)
W74-02002

AQUATIC AND ATMOSPHERIC SIMULATION,
California Univ., Livermore. Lawrence Livermore Lab.
J. B. Knox, D. M. Hardy, and C. A. Sherman.
Available from NTIS, Springfield, Va., as UCRL-51405; $4 in paper copy, $1.45 in microfiche. Report UCRL-51405, June 1973. 11 p, 8 fig, 15 ref.

Descriptors: *Mathematical models, Water pollution, *Environmental effects, *Estuarine environment, Bays, Air pollution, *Path of pollutants, Tracers, Model studies, Hydraulic models, *California, *Simulation analysis.
Identifiers: San Francisco Bay.

Mathematical models developed at Lawrence Laboratory are reviewed, those both for aquatic systems and for atmospheric systems (that may be adapted to aquatic systems). Dredge disposal on a small scale may be simulated by a hybrid (Lagrangian-Eulerian) 3-dimensional code for atmospheric dispersion of particles (ADPIC). For regional-scale systems such as the San Francisco Bay which require long-term numerical integration, a model developed to describe advective-diffusive transport for air pollution may be applied. Validation of the model would require either on-site tracer experiments or comparison of calculated fluxes with those measured in one of the Corp of Engineers' physical models. (Bopp-ORNL)
W74-02003

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02004

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02005

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF TROJAN NUCLEAR PLANT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02006

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS AND SOLID WASTE FROM NUCLEAR POWER PLANTS FOR 1972.
Directorate of Regulatory Operations (AEC), Washington, D.C.

Available from Assistant Director for Radiological, Environmental and Materials Protection; Directorate of Regulatory Operations; Washington, D.C. 20545, Free. August 1973. 68 p, 34 tab.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactivity, *Air pollution, *Water pollution, *Water pollution sources, Nuclear wastes, Data collections, Gases, Liquid wastes, Solid wastes, Regulation, Legal aspects, Administrative agencies, Public health.

A tabulation is presented of radioactivity in effluents and solid waste from nuclear power plants for calendar year 1972. The data included are those reported by the licensee except for certain calculations made by the Regulatory staff. A similar report was made for 1971. This report shows that the radioactivity in effluents from licensed nuclear power plants has generally been low in comparison with the limits set forth in the Atomic Energy Commission's Part 20 of Title 10, Chapter 1, Code of Federal Regulations, 'Standards for Protection Against Radiation'. (Houser-ORNL)
W74-02011

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W74-02012

GROUND DISPOSAL OF REACTOR COOLANT EFFLUENT,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. R. Eliason, and B. F. Hajek.
Available from NTIS, Springfield, Va., as Rept. BNWL-CC-1352. $4.00 per copy, $1.45 per microfiche. Report No. BNWL-CC-1352, September 1967. 19 p, 12 fig, 2 tab, 6 ref.

Descriptors: *Coolant, *Nuclear powerplants, *Effluent, *Radioactive waste, *Radioactive waste disposal, Groundwater, Hydrogeology, Groundwater pollution, Groundwater movement, Water pollution sources, Water pollution treatment, Ion exchange, Absorption, Radioisotopes, Chromium, Zinc.

A study in which reactor coolant effluent was disposed to an existing trench at 100-D Area was conducted for a four-month period, March-June 1967. During this time 3.367 x 10 (9) gallons of effluent were infiltrated at an average rate of 1277 gal/day/ft sq. Groundwater elevations and temperatures increased in the vicinity of 100-D; however, no significant decrease in infiltration rate occurred. Decontamination factors ranged from 2.5 for Cr-51 to greater than 276 for Zn-65. These are probably minimum decontamination factors since the route followed by wastes moving from the trench to the springs is considered to be the path having the shortest travel time. Groundwater elevations quickly returned to near pre-test levels upon termination of disposal; however, groundwater temperatures are decreasing slowly. This study showed that large volumes of reactor coolant effluent can be disposed to the ground for significant periods of time. The decontamination achieved is probably greater than could be obtained by any other treatment process. (Houser-ORNL)
W74-02013

RADIOACTIVE WASTE MANAGEMENT IN ITALY,
Comitato Nazionale per L'Energia Nucleare, Rome (Italy).
For primary bibliographic entry see Field 05D.
W74-02014

THE MONITORING OF TRITIUM IN THE AQUATIC ENVIRONMENT OF POWER REACTORS,
Radiation Management Corp., Philadelphia, Pa.
S. W. Porter, Jr.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 517-521, May 1973. 3 fig, 8 ref.

Descriptors: *Tritium, Measurement, *Monitoring, *Pennsylvania, *Maryland, *Radioactivity, Rainfall, Rivers, Watersheds (Basins), Water pollution sources, Surface waters, Water wells, Effluent, Nuclear powerplants, Nuclear detonation, Susquehanna River, Public health.

A coordinated tritium sampling program has been initiated in the Pennsylvania-Maryland area by the Radiation Management Corporation. Tritium is measured in rainfall, river water, public drinking water, and well water from the various watersheds. In addition, after the start-up of nuclear generating stations, the program includes reactor discharge water measurements. The object of this regional sampling program is to measure background levels of tritium and their variations (seasonal, etc.), as well as to measure the contribution from nuclear generating stations. (Houser-ORNL)
W74-02015

ANALYSIS FOR TRITIUM IN WATER: INTERCOMPARISON STUDY OF NOVEMBER 1970,
Analytical Quality Control Service, Winchester, Mass.
E. J. Baratta.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 522-530, May 1973. 9 fig, 4 tab, 4 ref.

Descriptors: *Tritium, *Analysis, *Analytical technique, *Assay, *Bioassay, *Water, Water quality control, Sampling, Administrative agencies, Statistical methods, Average.

A procedure of quality control to assist laboratories in producing accurate and comparable data on tritium concentrations in water is necessary. The Analytical Quality Control Service (AQCS) has attempted to aid this endeavor. In addition to conducting an interlaboratory tritium cross-check program, the AQCS conducted this intercomparison study in November 1970, to assist the laboratories in evaluating their precision and accuracy. Three different levels of tritium were used, including a biological sample, to study the response of tritium radiochemical techniques as used by each laboratory. These levels are above those normally found in the environment so that the laboratories may isolate, identify, and correct any problems associated with their analyses. One problem that arose was unforeseen. The activity of the spiked solution was four percent low from that originally reported. This was first detected by observing that the data from all the laboratories seemed to be biased low. (Houser-ORNL)
W74-02016

TRITIUM RELEASES FROM NUCLEAR POWER STATIONS,
National Environmental Research Center, Cincinnati, Ohio.
H. L. Krieger, S. Gold, and B. Kahn.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 557-564, May 1973. 4 tab, 27 ref.

Descriptors: *Tritium, *Radioactivity, *Effluent, *Nuclear powerplants, Nuclear energy, Productivity, Environmental effects, Water pollution, Air pollution, Soil contamination, Absorption, Public health, Forecasting, Projections.
Identifiers: *Fuel reprocessing.

Tritium in effluents from nuclear power stations and associated facilities is of particular interest because it is the most prevalent radionuclide in liquid wastes and is exceeded among long-lived radionuclides in gaseous effluents only by Kr85. Fortunately, the radiation hazard per curie of tritium is low compared to most other radionuclides, because tritium releases relatively little energy per disintegration and has a short residence time in the human body. Nevertheless, due to its relatively high concentrations, tritium may be the critical radionuclide for calculating population radiation exposures at a number of nuclear power facilities. The release of tritium to the environment at routinely operating nuclear power stations and at a fuel reprocessing plant is reviewed on the basis of production estimates, operating reports by these facilities, and data from radiological surveillance studies. The latter were performed at a boiling-water reactor, a pressurized-water reactor, and a fuel-reprocessing plant. (Houser-ORNL)
W74-02017

ENVIRONMENTAL TRITIUM CONTAMINATION FROM NUCLEAR POWER PROGRAM,
Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
V. K. Gupta, and S. D. Soman.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 564-571, May 1973. 4 fig, 2 tab, 12 ref.

Descriptors: *Tritium, *Nuclear powerplants, *Effluent, *Nuclear energy, *Productivity, *Environmental effects, Air pollution, Water pollution, Soil contamination, Public health, Forecasting, Measurement, Assay, Population, Food chains.
Identifiers: *Fuel reprocessing.

The estimate for the growth of electrical power in India by the end of fourth five-year plan, i.e., 1974, is 23 GWe. Assuming a consumption growth rate of 12%, the country will need about 45 GWe of installed capacity by 1980. The Indian Atomic Energy Commission, in its recent publication on the growth of atomic energy, has proposed that about 2700 MWe power should be generated by 1980 from nuclear energy. The Commission has indicated that these nuclear power stations will be of CANDU design, utilizing heavy water as both moderator and coolant and natural U02 as fuel. By 1980, three fuel reprocessing plants are expected to process the irradiated fuel from the power reactors. It is proposed that one fast breeder reactor (40 MW) will be built to provide a base for the fast breeder power stations expected after 1980. Tritium is a radionuclide of interest because of its radiological properties and appreciable production. It is released to the environment as a consequence of normal operation in both nuclear power reactors and fuel reprocessing plants. (Houser-ORNL)
W74-02018

TRITIUM GENERATION AND RELEASE TO IN-PLANT AND OFF-SITE ENVIRONS OF THE LA CROSSE BOILING WATER REACTOR,
Dairyland Power Cooperative, LaCrosse, Wis.
T. A. Steele.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 585-591, May 1973. 2 fig, 2 tab, 6 ref.

Descriptors: *Tritium, *Effluent, *Nuclear powerplants, *Wisconsin, Environment, *Environmental effects, Population, Air pollution, Water pollution, Water pollution sources, Food chains, Public health, Measurement, Equilibrium, Path of pollutants, Meteorology.

A large percentage of tritium produced in a direct cycle boiling water reactor utilizing stainless-steel cladding, such as the La Crosse Boiling Water Reactor (LACBWR), is released to the primary water and plant environs and eventually to the environment. The percentage of the tritium produced by ternary fission which is released at LACBWR is mostly a function of the primary water concentration and, hence, the amount diffusing through the fuel cladding. The primary pathway to the environment is liquid waste and possible condenser cooling water. During recent months of LACBWR operation, from 50 to 95% of the tritium produced from ternary fission was released if equilibrium conditions are assumed. The diffusion mechanism appears to be the primary pathway of leakage to the environment. Additional investigation is necessary to both quantify and determine the release mechanism of tritium through the surface condenser. (Houser-ORNL)
W74-02019

ENVIRONMENTAL TRITIUM SURVEILLANCE FOR PROJECT RULISON,
National Environmental Research Center, Las Vegas, Nev.
D. T. Wruble, V. E. Andrews, and G. A. Boysen.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 592-602, May 1973. 1 fig, 3 tab, 9 ref.

Descriptors: *Tritium, *Nuclear energy, Secondary recovery (Oil), *Natural gas, Hydrofracture, Effluent, Air pollution, Water pollution, *Radioactivity, Water pollution sources, Monitoring, Surveys, Public health, Population.

The off-site surveillance program for the reentry and production test phases of project RULISON was designed to monitor the environment for tritium and Kr85 in particular. The program was also designed to monitor for C14 and other radioactive products that might be released from the test well. Because of the relative ease of collecting atmospheric moisture for tritium analysis and the somewhat greater public health significance expected for the released tritium, it was chosen as the radionuclide for routine air surveillance. Net Kr85 concentrations could be estimated from net tritium concentrations and from the measured ratio of the two gases at the wellhead. In addition, tritium would be the only radionuclide expected in other environmental samples. The procedures and results are reported of the off-site tritium monitoring program conducted during the reentry and production testing phases by the Western Environmental Research Laboratory. (Houser-ORNL)
W74-02020

EXPERIMENTAL RESULTS FROM PROCESSING GASBUGGY GAS IN A NATURAL GAS PROCESSING PLANT,
Oak Ridge National Lab., Tenn.
M. J. Kelly, C. J. Barton, A. S. Meyer, E. W. Chew, and C. R. Bowman.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 603-611, May 1973. 3 fig, 4 tab, 6 ref.

Descriptors: *Tritium, *Natural resources, *Oil, *Natural gas, *Nuclear explosions, Nuclear engineering, Secondary recovery (Oil), Water pollution, Soil contamination, Public health, Monitoring, Radioactivity, Moisture, Adsorption, Analytical techniques, Assay, Bioassay, Human pathology, Epidemiology, Hydrofracturing, Industrial production.
Identifiers: Plowshare, Gasbuggy, Rulison.

The use of nuclear devices to increase natural gas production from otherwise unproductive gas fields has been tested in the Gasbuggy and Rulison experiments. Other tests are planned. The use of such nuclear devices results in low levels of tritium and Kr85 in the natural gas produced from such wells. Studies in the Health Physics Division of the Oak Ridge National Laboratory (ORNL) are providing estimates of the potential radiation dose that might occur through the use of gas produced from nuclearly stimulated wells. An experiment was performed in cooperation with El Paso Natural Gas Company (EPNG) to test the validity of prior calculations on the distribution of tritium among the various processing plant products ('dry' gas, butane, propane, and natural gasoline), to determine if isotopic exchange occurs between tritiated components of natural gas and the absorption oil used for product extraction, and to study the exposure of plant operating personnel during the processing of gas from a nuclearly stimulated well. (Houser-ORNL)
W74-02021

ENVIRONMENTAL TRITIUM STUDIES AT A PWR POWER PLANT,
New York Univ. Medical Center, N.Y.
L. K. Cohen, and T. J. Kneip.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 623-639, May 1973. 6 fig, 6 tab, 19 ref.

Descriptors: *Tritium, *Air pollution, *Water vapor, Hydrologic cycle, *Water pollution, Water pollution sources, Nuclear explosions, Measurement, Assay, Bioassay, Radioactivity, Biota, Sediments, Behavior, Ecology, Environment, Monitoring, Sampling, Water analysis, *Hudson River, Nuclear powerplants, Effluents, Public health, *New York.
Identifiers: Indian Point (NY), *Pressurized water reactor.

Tritium produced by natural or artificial processes in the atmosphere is oxidized to form water, and follows the hydrologic cycle. Before the introduction of large quantities by thermonuclear detonations, levels of tritium in the environment were very low and were studied only as a scientific curiosity. Because of the extremely low concentrations of tritium even after the advent of bomb tests and the resulting measuremnt problems, the retention or incorporation characteristics of tritium in biota and sediment in the organically bound state are not well known. With the expansion of the nuclear power industry, increased quantities of tritium are expected to be released in localized areas, and there is a need to know more about the behavior of tritium in the environment. This study was designed to define the relative concentrations of tritium in several compartments of an estuarine environment. Measurements were made of tritium in the loose and organically bound water in bottom sediments, rooted aquatic plants, fish, and ambient water. The area selected for this study was a 30 mile section of the Hudson River estuary which includes the nuclear power facility at Indian Point. This pressurized water reactor has been in operation since 1962 and is presently releasing 400 to 1100 curies of tritium per year to the estuary. (Houser-ORNL)
W74-02022

TRITIUM INTAKE IN NEW YORK,
New York Operations Office (AEC), N.Y. Health and Safety Lab.
D. C. Bogen, C. A. Henkel, C. G. C. White, and G. A. Welford.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 639-646, May 1973. 6 tab, 9 ref.

Descriptors: *Tritium, *Radioisotopes, *Biological control, Biology, *Biological communities, *Ecosystems, *Food chains, Human pathology, Epidemiology, Public health, Bioassay, Assay, Analystical techniques, Air pollution, Water pollution, Domestic water, New York.
Identifiers: *New York City.

Tritium has been considered one of the least hazardous of the radioactive isotopes, partly because of its low energy beta-particles of 18 keV maximum and because the maximum penetration range is 5 micrometers for unit density matter.

Also, the biological half-life is relatively short (8 to 14 days for man) and large doses are tolerated by experimental animals. Woodard has stated that about 2% of the tritium intake, as tritiated water, is incorporated into tissue compounds and that the biological half-lives are much longer, about 20 to about 400 days. According to Woodard, incorporation of tritium as tritiated water into body components is rapid, and tritium is observed in two compartments. The first compartment is tissue free water tritium, which is removed from the sample by mild distillation techniques or lyophilization. The second compartment is the dried tissue which is ashed and the water of combustion measured for tissue combined tritium. In a dietary study, samples were freeze dried to obtain the free water tritium and then the dried residue was combusted and the water of combustion measured for the combined tritium. (Houser-ORNL)
W74-02023

SOME CHARACTERISTICS OF SOIL AND PERENNIAL VEGETATION IN NORTHERN MOJAVE DESERT AREAS OF THE NEVADA TEST SITE,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
E. M. Romney, V. Q. Hale, A. Wallace, O. R. Lunt, and J. D. Childress.
Available from NTIS, Springfield, Va., as UCLA-12-916; $10.60 in paper copy, $1.45 in microfiche. Report UCLA-12-916, June 1973. 340 p, 6 tab, 67 ref.

Descriptors: *Desert plants, *Fallout, *Vegetation regrowth, On-site data collections, Speciation, Plant physiology, Radioisotopes, Absorption, Cycling nutrients, Soil properties, Bibliographies, *Nevada, Ecology, *Soil-water-plant relationships, Soil moisture, Radioecology, Rainfall.
Identifiers: *Mojave Desert (Nev).

This document and an earlier volume (see W73-04300) contain results from a five-year team research effort to obtain information on soil and plant relationships in the desert biome for use in future ecosystems-analysis work concerning the impact of nuclear testing. This volume compiles (1) the modifying effects of shrubs on the physical and chemical characteristics of soil and profiles, (2) the volume and biomass of perennial vegetation, (3) mineral element compositions of the prominent plant species, (4) Cs137, K40, U, and Th in surface soil, (5) rainfall, air temperature, soil temperature, and soil moisture. (Bopp-ORNL)
W74-02024

RADIOTRACER TECHNIQUE FOR THE STUDY IN VIVO OF THE BIOLOGICAL PATHWAY OF HEAVY METALS IN AQUATIC ORGANISMS,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 05C.
W74-02025

DISPOSAL OF WASTE HEAT,
Department of the Interior, Washington, D.C. (Assignee).
A. Cywin.
U. S. Patent No. 3,760,868, 3 p, 2 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1271, September 25, 1973.

Descriptors: *Patents, Water supply, Domestic water, *Pollution sources, *Thermal pollution, *Heat exchange, *Pollution abatement, Heated water, Power plants.

The soil mass surrounding the mains and laterals of municipal domestic water distribution system is used as a heat sink for the waste heat produced as a by-product of power generation. After absorbing heat in a heat exchanger, the stream is passed to the distribution network making up the municipal water supply system. Water introduced in this manner tends to reach temperature equilibrium with the surrounding ground mass. Waste heat from a power plant or other industrial process is distributed over a wide area. Some treatment of the water is often necessary to prevent fouling and plugging of the heat exchanger. (Sinha - OEIS)
W74-02029

FLOATABLE-SUBMERSIBLE VESSEL CONTAINER,
Nuclear Waste Systems Co., Campbell, Calif. (assignee).
J. Mertens.
U. S. Patent No. 3,760,753, 4 p, 9 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1241, September 25, 1973.

Descriptors: *Patents, *Radioactive wastes, *Waste disposal, *Water pollution sources, Equipment, Oceans.

A vessel container is described which may be used for storing contaminants, such as radioactive waste material. The container is adapted to float on the sea surface while carrying large volumes of contaminant material. The container can be towed to sea for sinking. It is further adapted to provide for pressure equalization while sinking. The vessel may also be adapted for subsequent retrieval, if desired. A cylindrical shell with end covers is constructed of ferro-cement or other suitable material for sealing radiation from the contaminant material. The shell carries a keel and reinforcing ribs. Depending on the mode of filling, the container may include stand-up supports carried by one of the end covers for vertical support of the container. A combination flood and check valve and a combination vent and check valve provide for connection to an umbilical cord. Thus, sea water may enter the flood valve to fill the container such that the container sinks. A corrosive member holds the valves open for a predetermined time until the members have eroded, thereby closing the valves. The valves now serve as check valves. As the vessel continues to sink, the pressure differential between outside and inside opens the check valves, thus equalizing the pressure in the drum. (Sinha - OEIS)
W74-02040

RADIONUCLIDES IN ECOSYSTEMS.
Available from NTIS, Springfield, Va., as CONF-710501; $27.20 (2 vol. set) in paper copy, $1.45 in microfiche. Proceedings of the Third National Symposium on Radioecology, May 10-12, 1971. Oak Ridge Tennessee Report CONF-710501, (1971). 1,250 p.

Descriptors: *Radioecology, *Research and development, *Conferences, *Thermal pollution, Nuclear powerplants, *Path of pollutants, Environmental effects, Water pollution effects.

Since the 1967 Radioecology Symposium in Ann Arbor, Michigan, the alteration of thermal regimes of aquatic habitats has become an important issue; consequently, a discussion of thermal amendments to aquatic ecosystems is considered an integral part of this symposium. The mission-related research reported here depends on fundamental research, but radioecology also continues to contribute to understanding of basic environmental processes. Participation was encouraged by scientists and engineers who had contributions about assessment of nuclear energy technology applications to human welfare. (See W74-02047 thru W74-02050) (Bopp-ORNL)
W74-02046

PHYSICAL AND BIOLOGICAL DISPERSION OF THE HYPOLIMNETIC PHOSPHORUS OF A BOG LAKE SYSTEM,
Michigan Univ., Ann Arbor. School of Natural Resources.
F. F. Hooper, and D. G. Imes.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971, Oak Ridge, Tennessee, p 401-409. (1971) 7 fig, 11 ref. (CONF-710501).

Descriptors: *Cycling nutrients, *Phosphorus, *Radioecology, *Lakes, *Hypolimnion, Dissolved oxygen, Hydrogen ion concentration, Mixolimnion, Turbulence, Biological properties, Phosphorus radioisotopes, *Michigan, *Bogs, Tracers, Fluorescent dye.

Estimates of the quantity of P carried vertically by way of circulation in a small Michigan bog lake indicate that this is more important (up to 136 g in a 2- to 3-day period) than biological transport. A second source is P additions from bog mat that occurs at irregular intervals (when the mat is flooded by rain, and there is a flow of interstitial water from the mat into the lake). The lack of littoral sediments as a source for renewal of P gives bog systems low predictability as regards their nutrient supply and makes such systems highly dependent on the vertical intrusion described above. In this study, bottom water was labeled by rhodamine and P32 in the form of orthophosphate. (See also W74-02046) (Bopp-ORNL)
W74-02047

STABLE MANGANESE AND MANGANESE-54 DISTRIBUTIONS IN THE PHYSICAL AND BIOLOGICAL COMPONENTS OF THE HUDSON RIVER ESTUARY,
New York Univ. Medical Center, N.Y.
J. W. Lentsch, T. J. Kneip, M. E. Wrenn, G. P. Howells, and M. Eisenbud.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971. Oak Ridge, Tennessee, p 752-768. (1971) 17 fig, 6 tab, 22 ref. (CONF-710501).

Descriptors: *Manganese, *Estuarine environment, Aquatic life, *Absorption, *Hudson River, *Estuaries, Fish physiology, Nuclear wastes, Effluents, *Path of pollutants, Aquatic plants, Fish, Nuclear powerplants, Food chains, Public health, Radioecology, Monitoring, On-site investigations.

Samples were taken from a 30-mile sector during 1969 and 1970. Manganese-54 has been introduced into this section of the Hudson primarily in operational waste from the Indian Point unit 1 reactor. The manganese content of several species of rooted aquatic plants was proportional to the dissolved manganese concentration in water. However, several species of fish maintained relatively constant manganese levels, regardless of variable concentrations of manganese in water. Manganese dissolved in water appears to be more biologically available than sedimentary deposits of manganese, as indicated by the specific activities of Mn54 in water, bottom sediment, and biota. Manganese was leached from bottom sediments by seawater intrusion into freshwater regions of the estuary. Supplementary data on salinity, freshwater discharge, suspended sediment load, water temperature, pH, and dissolved oxygen are included to allow generalization of observed phenomena to other similar estuaries. (Bopp-ORNL)
W74-02048

ACCUMULATION OF SOLUBLE AND PARTICULATE RADIONUCLIDES BY ESTUARINE FISH,
National Marine Fisheries Service, Beaufort, N.C.
D. E. Hoss, and J. P. Baptist.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971. Oak Ridge, Tennessee, p 776-782. (1971) 5 fig, 5 tab, 17 ref. (CONF-710501).

Descriptors: *Nuclear wastes, *Zinc radioisotopes, *Marine fish, *Absorption, Path of pollutants, Fish physiology, Fish diets, Food chains, Public health, Water pollution effects.

Uptake was studied of Zn65 (soluble in seawater) and Ce144 and Cr51 (particulate in seawater) by estuarine fish, mummichog, flounder, Atlantic croaker, and menhaden. Comparisons were made between (1) accumulation of Zn65 and Ce144 from food and from water, and (2) accumulation of Zn65 and Cr51 in the presence and absence of a sediment substrate. The presence of a sediment substrate reduced the accumulation of both Zn65 and Cr51 by Atlantic croaker. Of the tissues analyzed, croaker muscle accumulated the least amount of both isotopes. Higher levels of Zn65 were accumulated by mummichog from food than from water. In contrast neither mummichog nor flounder accumulated appreciable amounts of Ce144 from food. Accumulation of Ce144 in the gastrointestinal tract of menhaden was attributed mainly to swallowed seawater. (See also W74-02046) (Bopp-ORNL).
W74-02049

RESPONSE OF BLUE-GREEN ALGAE TO TECHNETIUM,
Texas Univ., Port Arkansas. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
W74-02050

CONTRIBUTION TO THE STUDY OF THE MIGRATION OF RUTHENIUM-106 IN SOILS,
Commissariat a l'Energie Atomique, Cadarache (France). Centre d'Etudes Nucleaires.
J.-P. Amy.
Available from NTIS, Springfield, Va., as RFP-TRANS-140; $5.45 per copy, $1.45 per microfiche. CEA Report R-4168, Feb. 1971. 60 p, 22 fig, 24 tab, 39 ref. (Translation of a thesis).

Descriptors: *Radioactivity, *Soil contamination, Movement, Pollutants, *Deposition (Sediments), *Path of pollutants, Water pollution, Water pollution sources, Agriculture, Irrigation, Irrigation water, Food chains, Public health.
Identifiers: *Ruthenium, *France (Rhone River).

These investigations and results showed it is possible to determine from percolation and agitation tests the mobility of ruthenium-106 in soils after possible contamination of a site. We can then define the characteristics of the soils and the ruthenium-106 solutions which would favor an accumulation of radioactivity at the surface of the profile, which in certain cases of heavy pollution would cause a real danger of contamination of the arable soil layer. On the other hand, the mobility of ruthenium-106 will preclude its accumulation at a precise point in the environment in certain other conditions. This maximum mobility is obtained when the radionuclide is found in the form of anionic complexes in very permeable acidic soils of sandy texture and high content of organic matter; in contrast, it is minimum for cationic complexes percolating in calcareous soils with little filtering capability, clay texture and rich content of organic matter. In comparison to the artificial radionuclides produced by the nuclear industry, ruthenium-106 poses no problem concerning pollution of the environment; in fact its dispersion in the surroundings and its short half life constitute two favorable radioecologic factors. (Houser-ORNL)
W74-02051

BIOLOGICAL AND CHEMICAL STUDY OF VIRGINIA'S ESTUARIES,
Virginia Electric and Power Co., Richmond.
M. L. Brehmer.
Va Polytech Inst State Univ Water Resour Res Cent Bull. 45 p, 1-69, 1972. Illus.

Identifiers: Biological studies, Chemical studies, *Chlorophyll, *Estuaries, *Nitrogen, *Phosphorous, *Virginia.

Stations were established at the 20, 15, 10, 5, and < 5% isohalines as measured at the 3 m depth with a portable salinometer in the James, York, and Rappahannock estuaries, Virginia. Cruises were made monthly over a 2 1/2-yr period and water samples were collected from each station for physical, chemical, and biological analyses. Total N in the water column seldom exceeded 200 micrograms-at/l in the winter and spring and 50 micrograms-at/l in the summer and fall. Very little variation was noted within stations between years in the York and Rappahannock, but the James was less uniform. The chemical form of the N present was also more variable. Total P levels in the estuaries were usually less than 4 microgram-at/l with an average of less than 2 microgram-at/l. Particulate P was usually the dominant form at the transition zone between salt and freshwater; whereas, especially in the summer and fall, soluble P was the dominant form near the mouths of the system. Refluxing of regenerated P from the lower Bay on or from near-shore oceanic waters is suggested. Chlorophyll a levels in the water seldom exceeded 10 microgram-at/l. Values were usually the highest in the York system and lowest in the Rappahannock.--Copyright 1973, Biological Abstracts, Inc.
W74-02052

THE STATUS OF THE RADIOACTIVE WASTE DISPOSAL PROBLEM,
B. S. Kolychev, V. V. Kulichenko, and F. V. Rauzen.
Available from Plenum Pub. Corp., 227 W 17th, N.Y., N.Y. 10011; $15.00 per article. Soviet Atomic Energy Vol 33, No 3, September 1972. p 837-841, 9 ref.

Descriptors: *Nuclear powerplants, *Radioactivity, *Effluents, *Radioactive waste disposal, Waste treatment, Oceans, Seawater, Water pollution, Water pollution sources, Food chains, Public health, Hydrogen radioisotopes, Iodine.
Identifiers: *Tritium, USSR.

Reports on the concern of international authors in the field of radioactive waste disposal. The various technologies and methods of treatment, storage, and disposal of wastes in the form of gases, liquids, and solids are described. Of special interest are methods to control tritium and iodine. Noteworthy is the disposal of radioactive wastes in seas and oceans. (Houser-ORNL)
W74-02054

CESIUM DISTRIBUTION IN THE SURFACE LAYER OF THE PACIFIC OCEAN,
O. S. Zudin, B. A. Nelepo, A. N. Spiring, and A. G. Trusov.
Available from Plenum Pub. Corp., 227W 17th St., N.Y., N.Y.: $15.00 per article. Soviet Atomic Energy, Vol 32, No 4, April 1972. p 402-405, 5 fig, 13 ref.

Descriptors: *Nuclear explosions, *Fallout, *Atlantic Ocean, *Pacific Ocean, Measurement, *Assay, *Cesium, Strontium, Sampling, Analytical techniques, Distribution, Surface waters, Water pollution, Water pollution sources, Public health.

Significant aspects of testing of thermonuclear weapons are discussed. These include the history of testing, monitoring for strontium and cesium, difficulties experienced in analysis of samples, and subsequent development of improved methods of analysis and measurement. The surveillance program was initiated in the waters of the Pacific Ocean and subsequently checked by a similar program in the Atlantic Ocean. (Houser-ORNL)
W74-02055

RADIOACTIVITY MEASUREMENTS AT TARAPUR NUCLEAR POWER STATION ENVIRONMENT,
I. S. Bhat, A. A. Khan, and S. Chandramouli.
In: Proceedings of National Symposium on Radiation Physics; Bombay, India, Bhabha Atomic Research Center, Nov. 24, 1970. (CONF-701138), p 493-505, (1971) 9 tab, 3 ref.

Descriptors: *Environment, *Radioactivity, *Nuclear powerplants, Surveys, Monitoring, Effluents, Air pollution, Water pollution, Water pollution sources, Soil contamination, Sampling, Analytical techniques, Assay, Sea water, Air, Soil environment, Regulation, Public health.
Identifiers: *India, Maximum permissible concentration.

The Environmental Survey Laboratory at Tarapur has carried out four years of preoperational investigations on environmental radioactivity at the Tarapur site. In February 1969 the power reactors were put into operation and the station has been releasing low levels of radioactive liquid and gaseous effluents to the environment. The laboratory has been monitoring the increase in the radioactivity of the environment due to these discharges. The levels of radioactivation products and fission products in samples collected from land, air, and sea in the Tarapur environment and their comparison with maximum permissible levels are presented. The conclusions were that up to the time reported, the contamination of the environment is within the safe limits. The contamination on land due to plant releases is not detectable beyond 5 km from site. The contamination on sea is traceable up to 16 km on both sides of the power station along the coast. This is due to the oscillating movement of the coastal waters receiving the radioactive wastes. The contamination of the sea food, even though detectable, is quite neglible near the site where considerable fishing activity is present. (Houser-ORNL)
W74-02056

DISTRIBUTION OF RA-226 IN SOIL AND WATER,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
S. R. Rao, M. D. Borkar, and S. M. Shah.
In: Proceedings of National Symposium on Radiation Physics; Bombay, India, Bhabha Atomic Research Centre, Nov 24, 1970. (CONF-701138), p 507-512, (1971) 4 tab, 10 ref.

Descriptors: *Environment, *Radioactivity, *Human population, Nuclear powerplants, *Nuclear wastes, Air pollution, Water pollution, Water pollution sources, Soil contamination, Plant populations, Absorption, Food chains, Public health, Radium radioisotopes, Cesium, Strontium.
Identifiers: *India.

The radioactivity of the human environment has become a matter of concern in view of increasing utilization of radioactive materials by man. Interest has recently been aroused on the significance of manmade activity such as Cs-137 in the human food chain but knowledge of the natural radioactivity which forms the important component of environmental radioactivity is insufficient. Man is most likely in equilibrium with some of the naturally occurring radionuclides whereas this is not true of the artificially produced radionuclides. Ra-226 in the environment is probably close to equilibrium with human beings and knowledge of the Ra-226 content of the biosphere can lead to an understanding of environmental alpha activity. Soil and water are the important matrices through which the radioactivity is transferred to plants and animals which have direct bearing on the human food chain. Soil and water samples were collected from different locations and analyzed for Ra-226 content, which forms a significant part of the environmental alpha activity. The results obtained for various locations are compared and discussed. (Houser-ORNL)
W74-02057

RADIORUTHENIUM IN AQUATIC ENVIRONMENT OF TROMBAY,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
N. N. Dey, and K. C. Pillai.
In: Proceedings of National Symposium on Radiation Physics, Bombay, India, Bhabha Atomic Research Centre, Nov 24, 1970. (CONF-701138), p 541-553, (1971). 3 fig, 6 tab, 8 ref.

Descriptors: *Monitoring, *Environment, Nuclear powerplants, Effluents, Assay, Measurements, Wells, Strontium, Cesium, Seawater, Sediments, Silts, Benthic fauna, Benthic flora, Seasonal.
Identifiers: *Fuel reprocessing plant, *India (Trombay Bay), *Radioruthenium.

Subsequent to the appearance of radioactivity above background levels in some wells located near the fuel reprocessing plant at Trombay, detailed studies were undertaken to identify and measure the concentration of radionuclides in the well waters. The measurement of total beta, radioruthenium, Sr-90 and Cs-137 concentrations indicated that radioruthenium is the most predominant radionuclide in well waters. The nature of radioruthenium in well waters was investigated. Measurements made during the last 30 months showed seasonal variations in the activity levels. Radioruthenium measurements in seawater, silt, and bottom sediments in the Bombay Harbor Bay indicated low levels in seawater and high concentration in sediments. The radioruthenium in sediments was limited to the discharge locale. Levels were low compared to Cs-137. Some benthic organisms collected in the bay from areas close to the effluent discharge locations showed high concentration factors for radioruthenium. (Houser-ORNL)
W74-02058

HISTOGENESIS AND FUNCTIONING OF THE HYPOPHYSIS AND THYROID GLAND IN THE LARVAE OF ATLANTIC SALMON EXPOSED TO IONIZING RADIATION,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
For primary bibliographic entry see Field 05C.
W74-02064

CHANGE IN PERIPHERAL BLOOD IN THE EMBRYOS AND LARVAE OF ATLANTIC SALMON UNDER THE INFLUENCE OF RADIOACTIVE CONTAMINATION OF THE WATER AND X-RAYS,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
For primary bibliographic entry see Field 05C.
W74-02066

POLYCHLORINATED BIPHENYL RESIDUES IN HUMAN PLASMA EXPOSE A MAJOR URBAN POLLUTION PROBLEM,
National Environmental Research Center, Research Triangle Park, N.C.
J. Finklea, L. E. Priester, J. P. Creason, T. Hauser, and T. Hinners.
Am J Public Health. Vol 62, No 5, p 645-651. 1972.
Identifiers: DDT, Dieldrin, Insecticides, Plasma, Pollution, *Urbanization, *Polychlorinated biphenyls, *Pesticide residues.

Polychlorinated biphenyl (PCB) residues and chlorinated hydrocarbon pesticide residues were assayed in 723 plasma samples collected from healthy volunteers from a single southeastern county (USA) who were not occupationally exposed to pesticides. As expected, pp'DDT and DDE residues were almost universal. Residues of DDD (84%) and dieldrin (63%) were common. PCB residues (up to 29 ppb) were found in 43%. Significant age effects, not always linear, were observed for all residues except dieldrin and PCB. Ethnic differences were marked for every residue and ethnic-residence interactions were significant for all except dieldrin. Independent residential effects were observed for all except DDE and dieldrin. Six differences were noted only for pp'DDT and DDE. PCB residues were more frequent and higher in whites and urban residents. Residues were rare (4.1%) in rural blacks. Likely urban exposure routes of PCB include polluted air and contaminated water. Similar occult pollution problems are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-02078

THE NEED FOR INTENSIFICATION IN ANIMAL PRODUCTION AND THE CONSEQUENT POLLUTION PROBLEM,
B.O.C.M. Silcock Ltd., Basingstoke (England).
P. N. Wilson.
J Sci Food Agric. Vol 23, No 12, p 1393-1398. 1972.
Identifiers: Animal, Beef, Lamb, Pollution, Poultry, *Livestock production, *Farm wastes.

The factors affecting the progress towards intensive livestock production are reviewed with particular reference to milk, beef, lamb, pork, bacon, poultry, meat and egg production. The future trends for the further development of intensive production in each class of livestock are considered and the genetic, managerial and economic constraints are briefly discussed. The different systems of management and housing of the various livestock classes are reviewed and the relevance of each system to the production of effluent is described. The reasons for the trends towards greater control of the animals' environmenta are listed. Finally, the concept of 'stocking density' is considered in respect to the problem of pollution in intensive animal production systems and the possible implications of removing all forms of 'animal pollution' are placed within the context of the other requirements for food production involving domesticated animals.--Copyright 1973,Biological Abstracts, Inc.
W74-02092

CONTRIBUTION TO MINERAL NUTRITION OF CATTLE FROM DRINKING WATER,
For primary bibliographic entry see Field 05A.
W74-02103

CONTRIBUTION TO THE LIMNOLOGY OF HIGH MOUNTAIN LAKES IN CENTRAL AMERICA, (IN GERMAN),
Vienna Univ. (Austria).
For primary bibliographic entry see Field 02H.
W74-02107

MUNCIE INDIANA'S 'TOTAL' LOCAL WATER QUALITY PROGRAM,
Muncie Sanitary District, Ind. Water Quality Div.
J. M. Craddock.
Water and Sewage Works, Vol 120, No 6, p 74-81, June 1973. 5 fig, 6 tab.

Descriptors: *Water pollution control, *Water pollution sources, *Pollution (Stream), Municipal wastes, Industrial wastes, Combined sewers, Outfall sewers, *Indiana, Water quality, Pollutant inditification.
Identifiers: *Muncie (Indiana).

The City of Muncie, Indiana has started a comprehensive program to control water pollution. Three major parts of the program are: (1) the control and prevention of stream pollution within the boundaries of the Muncie Sanitary District, (2) the monitoring of industrial and commerical wastes, and (3) the testing of treatment plant operation. Stream pollution is caused, in part, by the outflows from over 100 sources of raw sewage, phosphates, detergents, oil, heavy metals and other pollutants. Fecal coliform counts in one river have gone as high as 24 million per 100 ml, compared to the limit of 400 per 100 ml for safe swimming. Seven permanent, automatic sampling stations have been established on the area's major waterways. Tables which summarize the data obtained are presented. In early 1973, a total of 827 tests were being run in an average week, testing 21 parameters. Nine additional parameters are being considered for testing in 1973. Industrial and commercial wastes are monitored to determine the types of wastes which will require treatment and to require pretreatment of toxic wastes. Treatment plant operation is tested to keep a careful control on operations. Removal rates range from 99.999 percent for total and fecal bacteria to -10 percent for nickel. (Poertner)
W74-02132

GEOLOGY OF MOUNTRAIL COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-02145

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENTS IN SANDS: 1. SOIL TRANSFORMATIONS,
Wisconsin Univ., Madison. Dept. of Soil Science.
W. G. Walker, J. Bouma, D. R. Keeney, and F. R. Magdoff.
Journal of Environmental Quality, Vol 2, No 4, p 475-480, October-December 1973. 7 fig, 4 tab, 21 ref.

Descriptors: *Soil disposal fields, *Nitrogen, *Path of pollutants, *Biodegradation, Nitrification, Septic tanks, Hydraulic conductivity, Unsaturated flow.
Identifiers: Soil crusting.

Soil physical and chemical studies of five subsurface septic tank seepage beds were conducted to determine the biochemical transformations of N and thereby its potential for groundwater pollution. Effluent was ponded in all the seepage beds examined due to the presence of an impeding layer, a 'crust', at the boundary between the gravel bed and adjacent soil. The crust reduced infiltration rates approximately from 500 to 8 cm/day. Soil atmospheric composition 5 cm below the crust averaged 19.6% 02 and 0.66% CO2. Nitrogen in the septic tank effluent occurred as NH4-N (80%) and organic N (20%) with virtually no NO3-N. Organic-N was largely concentrated in the crust zone. Nitrification of NH4-N to NO3-N was essentially complete and commenced in the unsaturated subcrust soil within about 2 cm of the crust. Nitrification did not occur and NH4-N was absorbed by the soil below a seepage bed that was submerged in the groundwater. (See also W74-02148) (Knapp-USGS)
W74-02147

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENT IN SANDS: II. GROUND WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
W. G. Walker, J. Bouma, D. R. Keeney, and P. G. Olcott.
Journal of Environmental Quality, Vol 2, No 4, p 521-525, October-December 1973. 4 fig, 1 tab, 12 ref.

Descriptors: *Path of pollutants, *Soil disposal fields, *Nitrogen, *Biodegradation, *Groundwater, Soil water, Water pollution sources, Nitrates.

Groundwater observation wells were installed in the immediate vicinity of four septic tank effluent soil disposal systems. Potentiometric maps were constructed from measurements of the ground-

water level at each site to establish the direction of movement. Groundwater samples were pumped from each well to establish patterns of N enrichment in the groundwater around the seepage beds and to evaluate the performance of these disposal systems in sands in terms of N removal. Soil disposal systems in sands added significant quantities of nitrate formed by nitrification of NH4, the dominant form of N in the effluent, to underlying groundwater. In sands, the only active mechanism of lowering the NO3-N content is by dilution with uncontaminated groundwater. Relatively large areas of 0.2 ha downgradient were needed before concentrations in the top layer of the groundwater were lower than 10 mg/liter. The average N-input per person was 8 kg per year. Essentially complete nitrification in the soil results in addition of approximately 33 kg NO3-N to the groundwater per year for an average family of four. (See also W74-02147) (Knapp-USGS)
W74-02148

MOVEMENT OF TOXAPHENE AND FLUOMETURON THROUGH DUNBAR SOIL TO UNDERLYING GROUND WATER,
Clemson Univ., S.C.
K. S. LaFleur, G. A. Wojeck, and W. R. McCaskill.
Journal of Environmental Quality, Vol 2, No 4, p 515-518, October-December 1973. 3 fig, 5 tab, 27 ref.

Descriptors: *Path of pollutants, *Pesticide residues, *Pesticide kinetics, Chlorinated hydrocarbon pesticides.
Identifiers: *Toxaphene, *Fluometuron.

One hundred kilograms per hectare of toxaphene (octachlorocamphene) and 40 kg/ha of fluometuron (3- (m-trifluoromethylphenyl-l, l-dimethylures) were applied to Dumbar topsoil in a fieldplot in the South Carolina Coastal Plain. Loss of both pesticides from the topsoil and accumulation in underlying groundwater were monitored for 1 year. Toxaphene loss from topsoil occurred in two stages. The second (major) stage was crudely linear on a log residue vs. log time plot. Half-residence time in the topsoil was about 100 days. Fluometuron loss from topsoil occurred in one continuous episode that was crudely linear on a log residue vs. linear time plot. Half-residence time in the topsoil was about 120 days. Toxaphene and fluometuron were found in underlying groundwater within 2 months after they were applied to the topsoil. Both pesticides persisted in groundwater during the entire year. Overall, concentrations gradually decreased with time. (Knapp-USGS)
W74-02149

NITRATE IN SURFACE AND SUBSURFACE FLOW FROM A SMALL AGRICULTURAL WATERSHED,
Agricultural Research Service, Watkinsville, Ga.
W. A. Jackson, L. E. Asmussen, E. W. Houser, and A. W. White.
Journal of Environmental Quality, Vol 2, No 4, p 480-482, October-December 1973. 1 fig, 2 tab, 8 ref.

Descriptors: *Nitrates, *Path of pollutants, *Fertilizers, *Georgia, Corn (field), Water quality, Nutrients, Subsurface drainage, *Agricultural watersheds.

A small agricultural watershed on Cowarts loamy sand in the Georgia Coastal Plains was planted in corn each year from 1969 to 1971. Surface and subsurface water samples were collected during each natural rainfall runoff event and NO3-N was determined. The initial weighted average NO3-N concentration was 5 ppm in the subsurface runoff for 3 months before the first planting. The average was 7 ppm in 1969, 10 ppm in 1970, and 9 ppm in 1971. The concentration of NO3-N in most of the surface runoff for 3 years was less than 1 ppm; the maximum was 3 ppm. Subsurface flow accounted for 80% of the total runoff during the study period. Thus, greater amounts of NO3-N were discharged in subsurface flow than in surface flow from this watershed. (Knapp-USGS)
W74-02150

5C. Effects of Pollution

BIOLOGICAL CONTROL OF WATER WEEDS WITH PLANT PATHOGENS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
T. E. Freeman, R. Charudattan, and F. W. Zettler.
Available National Technical Information Service as PB-225 473/8 $3.50 in paper copy; $1.45 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 23, August 1973 52 p, 4 fig, 9 pl, 3 tab, 29 ref. OWRR B-011-FLA (10), 14-31-0001-3268.

Descriptors: *Aquatic weed control, Plant pathology, Blights, Spots, Viruses, Biocontrol, Aquatic weeds, Surveys, *Plant diseases, *Water hyacinth, *Alligatorweed, Water pollution effects.
Identifiers: *Hydrilla, *Eurasian watermilfoil.

A search was made for diseases of water weeds to use as biocontrol. Emphasis was placed on finding diseases of waterhyacinth (Eichhornia crassipes), alligatorweed (Alternathera philoxeroides), hydrilla (Hydrilla verticillata), and Eurasian watermilfoil (Myriophyllum spicatum). Surveys included all of Florida and parts of Alabama, Maryland, Louisiana, Georgia, South Carolina, the Chesapeake Bay and the Tennessee Valley areas. Also Puerto Rico, Guatemala, El Salvador, Panama, Colombia, Mexico, Barbados, Jamaica, Trinidad, and in the states of Mysore, Kerala, Tamilnadu, Kashmir, Uttar Pradesh, Rajasthan, Orissa and West Bengal in India. Foremost discoveries were: (1) A blight of waterhyacinth incited by Rhizoctonia solani in India, Panama, and Puerto Rico, (2) A zonate leaf spot of waterhyacinth incited by Cephalosporium zonatum, found in Florida and Louisiana and also in El Salvador, Puerto Rico and India, (3) A virus-induced stunting disease of alligatorweed from Florida, (4) A Pythium and Sclerotium incited blight of hydrilla and a Penicillium sp. that produces matabolites lysogenic to hydrilla, first ever recorded on hydrilla and (5) A root and crown disease of waterhyacinth of unknown cause in Florida.
W74-01653

RELATIVE LEACHING RATES OF COMMON NITROGEN CARRIERS FROM SANDY SOILS IN RELATION TO LAKE EUTROPHICATION,
Rollins Coll., Winter Park, Fla. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-01654

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.

Available from NTIS, Springfield, Va., as WASH-1249; $7.60 in paper copy, $1.45 in microfiche. Report WASH-1249, June 1973. 236 p, 19 tab, 730 ref. Compiled by C. D. Becker and T. O. Thatcher.

Descriptors: *Chemicals, *Reviews, *Toxicity, *Aquatic life, *Bibliographies, *Nuclear powerplants, Estuarine evironment, Effluents, Waste water (Pollution), Chemical reactions, Corrosion, Inhibition, Cooling towers, Path of pollutants, Water pollution effects, Aquatic habitats.

This report was prepared for the Atomic Energy Commission to aid the evaluations required by the National Environmental Policy Act of 1969. Data are summarized in tabular form on effects of chemicals (including those having potential uses in nuclear power plant operations) on organisms in freshwater, estuarine, or marine environments. The categories included are: acids; acrolein; arsenates and arsenites; ammonia, amines, and related compounds; boron; carbonates; chlorine and bromine; chlorinated or phenylated phenols; chromates; cyanurates and cyanides; hydrazine compounds; hydroxides; metals and their salts; nitrates and nitrites; potassium compounds; phosphates; silicates; sulfates, sulfides, and fluorides. References are cited, including sources for additional information. The uses of the chemicals, their reactions, and the reaction products that may occur in plant effluents are discussed briefly for each category. (Bopp-ORNL)
W74-01732

SPARTINA ALTERNIFLORA (TALL) PRODUCTIVITY IN A POLLUTED NEW JERSEY ESTUARY,
Lehigh Univ., Bethlehem, Pa. Dept. of Biology.
G. T. Potera, and E. E. MacNamara.
Bull N J Acad Sci, Vol 17, No 1, p 13-14, 1972, Illus.
Identifiers: *Estuary, Islands, *New Jersey (Long Island), Pollution, Seasonal, Spartina-alterniflora, *Cord grass, *Primary productivity.

Net primary productivity for cord grass, S. alterniflora (tall), based on several 1 m2 harvest sites from a polluted northern New Jersey estuary is presented. Average productivity for the New Jersey site was more than 40% greater than reported cord grass productivity at Hempstead, Long Island. The significant increase in productivity was attributed to a slightly longer growing season.--Copyright 1973, Biological Abstracts, Inc.
W74-01738

TOXICITY OF TWENTY-THREE INSECTICIDES TO A TUBIFICID WORM BRANCHIURA SOWERBYI FROM THE MISSISSIPPI DELTA,
Mississippi State Univ., State College. Dept. of Zoology.
S. M. Z. Naqvi.
J Econ Entomol, Vol 66, No 1, p 70-74, 1973, Illus.
Identifiers: Branchiura-sowerbyi, Gas chromatography, Delta, *Insecticides, *Mississippi delta, Morphological studies, Mortality, Procambarus-clarkii, Resistance, *Toxicity, *Tubificid worm.

Tubificid worms, B. sowerbyi Beddard, from the Mississippi delta region were bioassayed in 23 commercial insecticides (chlorinated hydrocarbons, organophosphates, and carbamates). Maximum concentrations of 15 insecticides (0.5-4.0 ppm at 21 deg C) failed to cause mortality in 72-hr exposure, but they produced reversible morphological changes of the worms. Variations in morphological changes occurred in response to an insecticide type rather than to concentration, and they may possibly be used for monitoring purposes. Insecticide toxicity was influenced also by temperature changes. The worms were extremely susceptible to dissolve chlorine in tap water (6-10 ppm) which caused complete disintegration of the body, leaving a residual black ring at the site of death. Insecticide-treated worms of known weight and treatment time were fed to crayfish, Procambarus clarkii Girard, and their mortality was recorded. Insecticide toxicity to crayfish was inversely proportional to treatment time of the worms prior to feeding, but was directly proportional to insecticide concentration. Crayfish showed less ill effects when they ate carbamate-treated worms, especially if the worms were exposed to the insecticide for a long time. Gas-chromatographic analyses of field-collected worms exhibited a high concentration of organochlorine compounds, especially DDT, DDD and DDE. Trace amounts of toxaphene also were detected. Possible mechanisms of insecticide resistance in tubificids are discussed, including the effects of mud in reducing the bioactivity of various insecticides.--Copyright 1973, Biological Abstracts, Inc.

W74-01740

DYNAMIC STATUS OF PRIMARY PRODUCTION IN LAKE YUNOKO, A SMALL EUTROPHIC SUBALPINE LAKE IN CENTRAL JAPAN,
Tokyo Univ. (Japan). Botanical Inst.
Y. Yamaguchi, and S-E. Ichimura.
Bot Mag (Tokyo), Vol 85, No 999, p 157-176, 1972, Illus.
Identifiers: Carbon, Chlorophyll, *Eutrophic lakes, *Japan (Lake Yunoko), Lakes, Microbial, Nitrogen, Phosphorus, Photosynthesis, *Phytoplankton, *Primary production, Respiration, Seasonal, Subalpine lakes.

The concentrations of PO4-P and NH3-N were highest in summer. The total amount of chlorophyll a in the entire water column varied from 45 mg/m2 to 405 mg/m2 during the year with the maximum values occurring in late spring and in Dec. These values are very high compared with those reported for other lakes in the same district. The standing crop of phytoplankton as organic C was approximately 50 to 70% of the total particulate organic C in the lake with values as high as 80 to 90% being obtained in the spring and autumn. The rate of photosynthesis under saturated light conditions was 3.7 mgC/mg chl a/hr in the case of phytoplankton of the sun type and 1.2 to 1.6 mgC/mg chl a/hr in those of the shade type. The daily gross primary production in the lake varied from a low of 134 mgC/m2 to a high of 1003 mgC/m2 during the year, the mean value being 372 mgC/m2. The total amount of daily microbial respiration varied from 177 mgC/m2 in winter to 1476 mgC/m2 in summer. Thus, the daily balance of production and consumption of organic matter in the lake itself was concluded to be negative. The main factor contributing to the rectification of this imbalance of material budget seems to be the leaf litter coming from the forest surrounding the lake. Lake Yunoko is a very productive and at the same time, fairly heterotrophic lake.--Copyright 1973, Biological Abstracts, Inc.
W74-01750

PHYTOPLANKTON OF THE UPPER YENISEI BEFORE THE SAYANY RESERVOIR FORMATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
I. S. Trifonova.
Gidrobiol Zh. Vol 8, No 4, p 5-10, 1972. (English summary)
Identifiers: Biomass, Cyanophyceae, *Diatoms, *Phytoplankton, Protococcaceae, Reservoirs, *USSR (Upper Yenisei), Volvocaceae.

Phytoplankton in the investigated section of the Yenisei (USSR) is qualitatively homogeneous. Diatoms amount to 60-100% of its total biomass; which varies from 8 to 70 g/m3. In shallow, well heated water bodies of the flood bed, phytoplanton are variable and abundant. The lake forms of Cyanophyceae, Protococcae and Volvocina predominate. Biomass is 2 g/m3 in the dam part of the Krasnoyarsk reservoir. Maximum biomass of phytoplankton is 3 g/m3. In the Sayany reservoir phytoplankton consist of rather variable but quantitatively poor river phytoplankton and abundant phytoplankton of flood bed water bodies. The composition, abundance and distribution of dominating forms are similar to that from the Krasnoyarsk reservoir, but because of the great flow and depth, the role of Cyanophyceae here is less.--Copyright 1973, Biological Abstracts, Inc.
W74-01757

MICROPHYTOBENTHOS AND OVERGROWING SOME RESERVOIRS IN TURKMENIA, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Askhabad. Institut Botaniki.
Kh. Sadykov.
Izv Akad Nauk Turkm SSR Ser Biol Nauk. No 4, p 37-43, 1972. (English summary).
Identifiers: *Benthos, Clayish, *Diatoms, Reservoirs, Sandy, Soils, *USSR (Turkmenia), *Cyanophyta, *Algae.

Algae (217 taxa) were recorded in 4 reservoirs of Turkmenia (USSR). Blue-green algae with a few green algae and diatoms are the principal components of the microphytobenthos of the reservoirs sandy and sandy-clayish soils. Microphytobenthos and algal blooms of the investigated reservoirs consist mainly of eurygal and common oligomesohalobic organisms.--Copyright 1973, Biological Abstracts, Inc.
W74-01758

ADAPTATION TO AMMONIA IN SITU BY SUBMERGED MACROPHYTES,
Freiburg Univ. (West Germany). Limnologisches Institut.
J. Schwoerbel, and G. C. Tillmanns.
Arch Hydrobiol Supplement B. Vol 42, No 1, p 139-141, 1972. Illus.
Identifiers: *Ammonia, Callitriche-Hamulata, *Macrophytes, *Nitrates, Nitrogen, Potamogeton-Perfoliatus, Ranunculus-Fluitans, Reductase, Submerged plants.

Fresh Ranunculus fluitans, Potamogeton perfoliatus and Callitriche hamulata, Submerged in water containing KNO3 and (NH4)2PO4 as N sources, absorbed ammonia intensively from the water, but took almost no nitrates over a period of several days. C. hamulata submerged in ammonia-free, nitrate-containing water absorbed no N for the first 7 days. After 14 days, nitrate was absorbed indicating an ammonia adaptation in habitat water is eliminated after 7-14 days in water with nitrates as the only N source. It is assumed that N reductase is inactive in the ammonia absorbing cells of the ammonia adapted plants.--Copyright 1973, Biological Abstracts, Inc.
W74-01759

UPTAKE OF SODIUM, CALCIUM, AND CHLORINE BY COTTON PLANTS DURING IRRIGATION WITH A SOLUTION SIMILAR TO SEA WATER, (IN RUSSIAN),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 03C.
W74-01766

THE EFFECTS OF OIL ON THE GILL FILTRATION RATE OF MYA ARENARIA,
Duke Univ., Durham, N. C. Dept. of Zoology.
G. E. Anderson.
Va J Sci. Vol 23, No 2, p 45-47. 1972.
Identifiers: Filtration, *Gill filtration, Mya-Arenaria, *Oil pollution, *Clams (Soft-shell).

The acute effects of oil pollution on the soft-shelled clam, Mya arenaria, were studied by measuring changes in turbidity of graphite-particle suspensions as indices of filtration rates. Filtration rates were measured during 3-hr intervals before and after exposure to either 0.9% oil-water emulsions or to 0.9% extracts of oil in water. A paired observations test indicated significant rate increases in clams exposed to the emulsions, but there were no definite trends in the responses of clams exposed to the oil extract.--Copyright 1973, Biological Abstracts, Inc.
W74-01773

PREDICTION OF COPPER TOXICITY IN RECEIVING WATERS,
Environmental Protection Service, St. John's (Newfoundland).
R. C. H. Wilson.
Identifiers: *Canada (Exploits River), *Copper toxicity, Prediction, *Salmon (Atlantic), Toxicity, Water pollution effects.

The 96-hr LC50 of copper to Atlantic salmon parr in water taken from the Exploits River, Newfoundland, Canada, is about 125 micro gram/liter at a total hardness of 8-10 mg/liter CaCO3 and a total alkalinity of 4 mg/l. However, the addition of spent sulphite liquor from a pulp mill allowed fish to survive more than 180 micro gram/l Cu. Considering the variety of organic compounds which have now been shown to chelate dissolved Cu, it is likely that a simple model for the prediction of Cu toxicity in waters receiving mine effluent will prove impossible.--Copyright 1973, Biological Abstracts, Inc.
W74-01775

EFFECTS OF DISSOLVED OXYGEN ON TWO LIFE STAGES OF THE MUMMICHOG,
National Marine Water Quality Lab., West Kingston, R.I.
R. A. Voyer, and R. J. Hennekley.
Prog Fish-Cult. Vol 34, No 4, p 222-225. 1972, Illus.
Identifiers: *Dissolved oxygen, *Mummichog, *Lethal limit, Water pollution effects, *Toxicity, Mortality.

Adult mummichogs were exposed for 6 hr to a range of dissolved oxygen (DO) levels (0.4-7.2 mg DO/l). Concentrations of DO lethal to 50% of the fish were 0.74-0.89 and averaged 0.80 for 3 tests. Mummichog embryos were incubated at 3 DO concentrations for 27 days. Mortality was maximum at the 14th day of exposure and was inversely related to O2 concentration. After 27 days exposure, 88% of the embryos hatched at 7.5 mg DO/l, 62% at 4.5 mg DO/l and 9% at 2.4 mg DO/l. A 50% hatch theoretically would occur at 3.9 mg DO/l.--Copyright 1973, Biological Abstracts, Inc.
W74-01776

EFFECT OF CERTAIN PHYSIOCOCHEMICAL FACTORS ON THE PLANKTON OF THE NANGAL LAKE,
Punjab Univ., Chandigarh (India). Dept. of Zoology.
K. K. Tandon, and H. Singh.
Proc Indian Acad Sci Sect B. Vol 76, No 1, p 15-25. 1972, Illus.
Identifiers: Dissolved oxygen, *India (Nangal Lake), Lakes, Light, *Physicochemical factors, *Phytoplankton, Seasonality, Temperature, Zooplankton, Hydrogen ion concentration.

Physical factors such as temperature of air and water and penetration of light, and chemical factors like pH, total alkalinity, dissolved oxygen and phosphates were studied for 1 yr in this Indian lake. Maximum and minimum temperatures of air were recorded in June 1969 and Feb. 1969, respectively, and that of water in Sept. 1968 and February 1969. Dissolved oxygen was maximum in May and June 1969 and minimum in Oct. 1968. pH did not show much variation. Penetration of light was maximum in April 1969 and minimum in June 1969. Maximum total alkalinity was observed in Oct. 1968 and minimum in Aug. 1968. Phosphates were absent in Oct. 1968. Maximum abundance of zooplankton generally followed the phytoplankton bloom.--Copyright 1973, Biological Abstracts, Inc.
W74-01778

DISSOLVED POLLUTION PRODUCT GASES IN NATURAL WATERS,
Maine Univ., Walpole. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-01786

CHEMISTRY AND APPLICATION OF ORGANOPHOSPHORUS COMPOUNDS, PROCEEDINGS OF THIRD CONFERENCE.
For primary bibliographic entry see Field 05B.
W74-01787

METABOLISM OF ORGANOPHOSPHORUS COMPOUNDS IN ANIMALS,
Leningradskii Meditsinskii Institut (I) (USSR).
For primary bibliographic entry see Field 05B.
W74-01790

DERIVATIVES OF PHOSPHACYCLOPENTENE,
Akademiya Nauk SSR, Kazan. Inst. of Organic and Physical Chemistry.
For primary bibliographic entry see Field 05B.
W74-01791

ANTICHOLINESTERASE PROPERTIES OF CERTAIN ORGANOPHOSPHORUS COMPOUNDS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
For primary bibliographic entry see Field 05B.
W74-01793

CERTAIN PROBLEMS IN THE QUANTITATIVE TOXICOLOGY OF ORGANOPHOSPHORUS COMPOUNDS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
For primary bibliographic entry see Field 05B.
W74-01795

METATHION--A NEW LOW-TOXICITY ORGANOPHOSPHORUS INSECTICIDE,
Vyzkumny Ustav Agrochemickej Technologie, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 05B.
W74-01796

NUTRIENTS IN NATURAL WATERS.

Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y. 1972. H. E. Allen and J. R. Kramer, editors. 457 p.

Descriptors: *Nutrients, *Eutrophication, *Cycling nutrients, *Nitrogen, *Phosphorus, *Carbon cycle, Chemical analysis, Simulation analysis, Mathematical models, Bioassay, Marine algae, Oxygen, Lake Erie, Lake Ontario, Lake Huron, Sulfur, Sedimentology, Lake Michigan, Trace elements, Detergents, Fallout, Waste water treatment, Biological treatment, Chemical degradation, Governments, Administration, Adoption of practices, *Nutrient removal.

The latest hypotheses and research on nutrients is presented by experts in the chemical and biological sciences and engineering, giving a broad coverage of all aspects of the chemistry, biochemistry, and geochemistry of nutrients in natural waters and of control policies of the United States and Canada. A broad discussion is featured describing the serious aquatic problems. In addition to chapters on the three principal nutrients, (nitrogen, phoshorus and carbon) including chemical and bioassay analyses, chapters on sediment diagenesis and nutrient regeration in hypolimnetic waters are included. Computer models of nutrient biochemical processes are described. Evidence for the increased rate of nutrient loading is given by geochemical studies of sediments. Atmospheric contributions of chemicals to the aquatic system are discussed with specific reference to Lake Michigan. The testing program to which a new detergent is subjected and the detergent requirements are given. Chapters on biological and physical-chemical waste treatment shed light on the present capabilities for nutrient removal and also indicate future directions for research. (See W74-01799 thru W74-01809) (Jones-Wisconsin)
W74-01798

NITROGEN: SOURCES AND TRANSFORMATIONS IN NATURAL WATERS,
Florida Univ., Gainesville. Dept. of Environmental Engineering.
P. L. Brezonik.
In: 'Nitrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 1-50. 10 fig, 12 tab, 115 ref. OWRR 16010 DCK.

Descriptors: *Nitrogen, *Nitrogen cycle, Nutrients, Sinks, Waterfowl, Nitrates, Ammonia, Ammonification, Nitrification, Denitrification, Nitrogen fixation, Agriculture, Fertilization, Clear-cutting, Rainfall, Pastures, Phosphorus, Feed lots, Eutrophication, Depth, Estuaries, Wisconsin, Mathematical studies, Land use, Population, Nitrites.
Identifiers: *Nitrogen sources, Nitrogen budget, Trophic state index, Nutrient loading rates.

The chemistry and biochemistry of nutrients in aquatic systems, the quantification of nutrient sources and sinks and the dynamics of nutrient uptake and release are discussed in relation to the nitrogen cycle in natural waters. Concentration and forms of nitrogen in a lake are the product of input rates, inter-conversion reactions within the lake, and the rates of loss from outflow, denitrification and sediment deposition. Nitrogen fixation rates measured with N-15 techniques in lakes and marine waters show high rates correlated with blue-green algal blooms, primarily Anabaena, Gloeotrichia, and Aphanizomenon in lakes, and Trichodesmium in subtropical marine waters. Processes of nitrogen cycling and interchange in sediments are complicated and poorly understood, since there is little information to establish in situ rates and controlling factors. Calculated nitrogen and phosphorus budgets for 55 Florida lakes exhibit significant correlation with their trophic states as measured by a quantitative index. Critical loading rates, above which eutrophication problems may occur, can be estimated by such regression relationships. Measured ammonia turnover times imply a rapid recycling of nitrogen between organic compounds and the ammonia pool. Decomposition of nitrite in soils by reaction with phenolic compounds has been recently reported. (See also W74-01798) (Jones-Wisconsin)
W74-01799

PHOSPHORUS: ANALYSIS OF WATER, BIOMASS, AND SEDIMENT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
J. R. Kramer, S. E. Herbes, and H. E. Allen.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 51-100. 3 fig, 4 tab, 184 ref.

Descriptors: *Phosphorus, *Water analysis, *Biomass, *Sediments, Agricultural runoff, Farm wastes, Limiting factors, Eutrophication, Detergents, Urban runoff, Nutrients, Phytoplankton, Zooplankton, Detritus, Fallout, Analytical techniques, Adsorption, Phosphorus compounds, Phosphates, Minerology, Calcium, Iron, Aluminum.
Identifiers. *Phorphorus sources, *Phosphorus cycle, Organic phosphorus, Orthophosphate.

In reviewing phosphorus as a nutrient, consideration is given to composition of phytoplankton, zooplankton, and detritus in context to the 'limiting' concept, biological utilization of phosphorus, analysis of various forms of the element in solution, and the mineral uptake and release of phosphorus. The 'limiting' nutrient concept is based on a fixed or approximately fixed organism composition. Another approach to organisms composition in context with the limiting nutrient is to ascertain minimum concentration of P/cell, P/cell volume or P/cell weight (interrelated for constant size and density) for growth. All phosphate determination methods commonly used are modifications of the Denige's colorimetric phosphomolybdic acid method. In addition to orthophosphate analysis, there may be need to acid hydrolyze or digest a sample aliquot of either filtered or unfiltered sample to determine the phosphorus fraction of interest. Exchange of phosphorus between sediment and water is perhaps the most important aspect of phosphorus in natural waters. Minimum solution of phosphorus at pH 5 to 7 corresponds closely to minima of solubility and pH of zero point of charge for aluminum-bearing minerals. These may be more significant than iron oxides and hydroxides in adsorption of phosphorus. (See also W74-01798) (Jones-Wisconsin)
W74-01800

THE CARBON CYCLE IN AQUATIC ECOSYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
P. C. Kerr, D. L. Brockway, D. L. Paris, and W. M. Sanders, III.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 101-124. 5 fig, 1 tab, 87 ref.

Descriptors: *Carbon cycle, *Nutrients, *Carbon, Inorganic compounds, Organic compounds, Bacteria, Carbon dioxide, Primary productivity, Cycling nutrients, Oxidation, Metabolism, Respiration, Photosynthesis, Carbonates.
Identifiers: *Carbon sources.

In general, there are four sources of inorganic carbon in aquatic ecosystems: atmosphere, carbonates, allochthonous inorganic carbon, and biological cycling of autochthonous and allocthonous materials. The relative rates at which the various nutrients cycle are the determinants of nutrient regulation of biological activity. Biological nutrient cycling results from the opposite but closely linked activities of autotrophic and heterotrophic organisms. Green plant photosynthesis is generally the major source of organic production, but a few data indicate rather large amounts of bacterial fixation. Organic material secreted by autotrophic organisms, organics secreted and excreted by heterotrophic organisms, and cellular constituents of all organisms at death constitute the carbon and energy source for heterotrophic populations. Allochthonous organic material, particularly deciduous leaves, constitutes a significant proportion of the total energy flow of many aquatic ecosystems. The rate (s) of these changes determine the instataneous availability of specific molecular forms of carbon and thus regulate species selection and growth of those organisms dependent on particular molecular carbon forms. It is necessary to ascertain the rates of nutrient cycling, and the genetic, environmental, and chemical factors affecting that rate, and thus nutrient availability, to comprehend the complexity of aquatic ecosystems. (See also W74-01798) (Jones-Wisconsin)
W74-01801

THE CHEMICAL ANALYSIS OF NUTRIENTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
P. D. Goulden.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 125-146. 37 ref.

Descriptors: *Analytical techniques, *Chemical analysis, *Nutrients, Carbon, Nitrogen, Phosphorus, Silica, Trace elements, Sampling, Preservation, Measurement, Data processing, Computers, Spectrophotometry, Fluorescence, X-ray fluorescence, Polarographic analysis, Solvent extraction, Filters, Chemical oxygen demand, Colorimetry, Separation techniques.

Identifiers: Sample pretreatment, Atomic fluorescence, Anodic stripping.

Analytical methods for forms of carbon, nitrogen, phosphorus, silica, and trace metals are described. A technique specifically measuring carbon content is conversion of carbon to carbon dioxide and measuring amount produced. Many methods are available for oxidation of organic carbon and for measurement of carbon dioxide produced. Infra-Red Carbonaceous Analyzers are used to determine total and organic carbon. The nitrogen forms that can be separated analytically are ammonia, nitrite, nitrate, and 'organic nitrogen.' Kjeldahl's classical digestion method for determination of 'organic nitrogen' and ammonia, has been automated in many forms, most commonly used is the 'Technicon' continuous digestor for the reaction with digestion mixtures, and the indophenol blue reaction serving to measure amount of ammonium ion formed. Phosphorus forms, conveniently measured, are: soluble orthophosphate, inorganic phosphate and total phosphorus. Soluble orthophosphate (reactive phosphate) is the phosphate in a filtered sample that reacts in molybdenum blue; silicon occurs as silicic acid and its salts. Silicic acid polymerizes quite readily and probably only short, straight chain polymers are measured by the customary silicomolybdate complex method. Trace metals are analyzed by atomic absorption spectrophotometry, atomic fluorescence, X-ray fluorescence, differential-cathode polarography, cathode-ray polarography, anodic stripping and solvent extraction. Sampling, preservation, pretreatment, and measurement process, and data handling are described. (See also W74-01798) (Jones-Wisconsin)
W74-01802

BIOASSAY ANALYSIS OF NUTRIENT AVAILABILITY,
Wisconsin Univ., Madison. Water Resources Center.
G. P. Fitzgerald.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 147-169. 3 tab, 20 ref, 1 append.

Descriptors: *Analytical techniques, *Bioassay, *Nutrients, *Limiting factors, Algae, Plant growth, Nitrogen fixation, Eutrophication, Ammonia, Absorption, On-site tests.
Identifiers: Lake Mendota (Wis.).

Growth tests with algae in water samples can determine relative ability of different water samples to support growth, which nutrient may be limiting growth, and how algae will respond to an increase in a nutrient or combination of nutrients. The value of bioassays is the record of responses of algae to growth conditions. To determine the biological availability of algal nutrients in a sample of water and to measure the response to changes in the growth-limiting nutrient, growth attained by selected algae can be measured in spiked and untreated samples, available nitrogen of the sample can be calculated from ammonium-nitrogen absorption rates after incubation with nitrogen-limited algae, available phosphorus of the sample can be calculated from increases in extractable phosphate-phosphorus after incubation with phosphorus-limited algae or increses in rate of acetylene reduction by phosphorus-limited, nitrogen-fixing algae. A summary is given of limnological facts recently corroborated by bioassay analyses. There is an obvious ecological preference for physical harvesting of aquatic weeds that, if killed by chemical treatment, could release some of their nutrients to the lake water in forms available for algal growth. (See also W74-01798) (Jones-Wisconsin).
W74-01803

NUTRIENT SUBMODELS AND SIMULATION MODELS OF PHYTOPLANKTON PRODUCTION IN THE SEA,
Washington Univ., Seattle. Dept. of Oceanography.
J. J. Walsh, and R. C. Dugdale.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John-Wiley and Sons, Inc., New York, N.Y., 1972, p 171-191. 14 fig, 1 tab, 21 ref.

Descriptors: *Marine algae, *Nutrients, *Model studies, *Simulation analysis, Phytoplankton, Productivity, Sea water, Distribution, Trophic level, Mathematical models, Computers, Upwelling, Outfall sewers, Food chains, Water temperature, Equations, Phosphates, Nitrates, Silicates, Chlorophyll, *California, Fisheries, Ammonia.
Identifiers: *Peru, Los Angeles (Calif.), Herbivorous fish, Marine outfall ecosystems, Plumes.

Simulation models of marine ecosystems consisting of sets of coupled non-linear partial differential equations describing the temporal and spatial distribution of nutrients and phytoplankton are described. Two ecosystems--upwelling and marine outfalls--are modeled. Modern high-speed computers must be used for numerical solution of the equations. Coastal upwelling ecosystems are being unraveled near San Juan, Peru where through a variety of methods including discrete station sampling and an automated system for mapping surface parameters, a picture of the distribution of certain variables was obtained. Plume structures occur in all major upwelling areas, and this environmental heterogeneity may be a key to the evolutionary development of the short, productive diatomaceous phytoplankton-clupeiform fish food chains found in these areas. The first model of the Peru upwelling system is based on a one-dimentional, two-layered series of spatial blocks aligned along the plume axes. For a marine outfall ecosystem, a two-dimensional, one-layered model of the Hyperion outfall at Los Angeles was developed. Transfer of materials in a complex system model is described through a series of submodels such as the terms of the first equation. Successful operation of the system model depends on the soundness of all the submodels. (See also W74-01798) (Jones-Wisconsin)
W74-01804

CHANGES IN C, N, P, AND S IN THE LAST 140 YEARS IN THREE CORES FROM LAKES ONTARIO, ERIE, AND HURON,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
A. L. W. Kemp, C. B. J. Gray, and A. Mudrochova.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 251-279. 8 fig, 4 tab, 40 ref.

Descriptors: *Carbon, *Nitrogen, *Phosphorus, *Sulfur, *Great Lakes, Cores, Lake Ontario, Lake Erie, Lake Huron, Carbonates, Hydrogen ion concentration, Oxidation-reduction potential, Sediments, Sediment-water interfaces, History, Eutrophication, Organic matter, Sedimentation rates, Urbanization.
Identifiers: Organic carbon, Total nitrogen, Total phosphorus, Carbonate-carbon, Total sulfur.

Total organic carbon, carbonate carbon, nitrogen, phosphorus, sulfur, pH, Eh, water content, and sediment texture in the top 50 cm of sediment in a single core from each of Lakes Ontario, Erie, and Huron were investigated to note changes near sediment-water interfaces, to measure the increase in C, N, P, and S loading to sediment in the last 140 years by relating the measurement to a time scale based on estimated sedimentation rates, and to compare cores from regions near industrial and urban sources of input with a core unaffected by urbanization. Cores were taken from near the deepest point in Lake Ontario, in central basin of Lake Erie, and in South Bay, Lake Huron. The maximum organic carbon, carbonate-carbon, nitrogen, phosphorus, and sulfur values in surface sediments are related to concentrations at the Ambrosia horizon. It is concluded that cultural eutrophication of Lakes Ontario and Erie has resulted, so far, in a threefold increase in sediment organic matter, nitrogen, and phosphorus above the natural sediment level. South Bay, relatively unaffected by cultural eutrophication, shows no appreciable change in sediment concentrations of carbon, nitrogen, phosphorus, and sulfur. (See also W74-01798) (Jones-Wisconsin)
W74-01805

EFFECTS OF SEDIMENT DIAGENESIS AND REGENERATION OF PHOSPHORUS WITH SPECIAL REFERENCE TO LAKES ERIE AND ONTARIO,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
J. D. H. Williams, and T. Mayer.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972. p 281-315. 10 fig, 2 tab, 65 ref.

Descriptors: *Sediments, *Diagenesis, *Phosphorus, *Lake Erie, *Lake Ontario, Eutrophication, Nutrient removal, Cycling nutrients, Sediment-water interfaces, Kinetics, Phosphorus compounds.
Identifiers: *Eutrophication reversal.

Eutrophication reversal is discussed with consideration of possible influence of phosphorus regeneration from sediments on time required to reverse eutrophication, net phosphorus regeneration from sediment columns in idealized and actual situations, mechanisms for nutrient transfer from sediments, phosphorus forms, forms and amounts of phosphorus in Great Lakes sediment, and analysis of piston core samples. If inputs of phosphorus and nitrogen were reduced or increased to a new constant level, the concentrations of total phosphorus and nitrogen would asymptotically approach a new mean steady-state value. Provided oxic conditions are maintained, reduction in phosphorus input should result in more rapid attainment of a new mean steady-state phosphorus concentration than would be predicted if the role of sedimentation is ignored. The prevalent view is that, given a sufficient period of time and provided the rate of input of phosphorus is controlled sufficiently, even the most eutrophic lake will revert to an oligotrophic condition. If this is done, regeneration of a part of the excess phosphorus that accumulated in the sediments during the eutrophic conditions may extend the transition period and delay the attainment of oligotrophic conditions, but the ultimate trophic state of the lake should not be affected. (See also W74-01798) (Jones-Wisconsin)
W74-01806

DETERGENT DEVELOPMENTS AND THEIR IMPACT ON WATER QUALITY,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
J. R. Duthie.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 333-352. 3 fig, 21 ref.

Descriptors: *Detergents, *Water quality, Phosphates, Formulation, Environmental effects, Wastewater treatment, Feasibility, Surfactants, Nitrilotriacetic acid, Silicates, Soaps, Laundering, Public health, Carbonates, Toxicity, Biodegradation, Legislation.
Identifiers: *Soap and detergent industry, Procter and Gamble.

Pressure to reduce or remove phosphates from detergents has made this the overwhelming technical objective of the detergent industry. Some facts are presented about the overall assessment of detergent materials, along with a discussion of new developments and their potential impact. Although the detergent industry does not expect environmentalists or wastewater treatment experts to assume the industry's burden of finding alternatives for phosphates, certain things can be done to create the climate in which responsible and productive changes can be made. The contribution that today's detergents make to cleanliness and health standards should be evaluated. Detergent phosphates in proper perspective are imporatnt ingredients and, although an algal nutrient, they are not pollutants or poisons. Phosphate removal from detergents, unless accompanied by appropriate waste treatment, has little chance of broadly arresting eutrophication. The diverse problems of pollution certainly will not disappear conincident with elimination of phosphates. Legislation unrealistically banning current formula ingredients before tested replacements are available can lead to unknown human and environmental risks. For major population centers, the combination of physical/chemical/biological treatment will provide maximum flexibility to remove a wide range of potential nutrients. (See also W74-01798) (Jones-Wisconsin)
W74-01807

ROLE OF THE FEDERAL GOVERNMENT IN CONTROLLING NUTRIENTS IN NATURAL WATERS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
A. F. Bartsch.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 421-431. 1 tab, 19 ref.

Descriptors: *Legislation, *Nutrients, *Control, Eutrophication, Waste treatment, Federal Water Pollution Control Act, Regulation, Lake Superior, Lake Michigan, Lake Erie, Lake Ontario, St. Lawrence River, Potomac River, Runoff.
Identifiers: Enforcement, Clean Lakes Act.

Fundamental questions dealing with several preliminary philosophical points are first considered--what are the options in controlling eutrophication. How does nutrient control relate to them. What nutrients in natural waters should be controlled. Where do they come from and in what amounts. Public anxiety about degradation of lakes has stimulated action at every level of government. Efforts of the federal government to control nutrients in natural waters involve provision of grant funds to assist in construction of community waste treatment facilities that incidentally or by design remove nutrients before discharge, intramural and extramural research to generate new knowledge and to demonstrate and activate management technology needed for effective nutrient control, enforcement actions to compel compliance in preventive and restorative programs, and provision of enabling and regulatory legislation. In summary, under governmental stimulation, controlling municipal sources of nutrient input through advanced treatment processes is a response to the demand for voluntary and regulatory actions. Progress has been made in decreasing phosphorus inputs that originate in synthetic detergents, and action continues. The massive and important task remaining is to provide technology to cope effectively with diffuse land runoffs. (See also W74-01798) (Jones-Wisconsin)
W74-01808

DEVELOPMENT OF NUTRIENT CONTROL POLICIES IN CANADA,
Department of Energy, Mines and Resources, Ottawa (Ontario). Inland Waters Branch.
A. T. Prince, and J. P. Bruce.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 433-446. 13 ref.

Descriptors: *Legislation, *Nutrients, *Control, *Canada, *Eutrophication, Phosphates, Governments, Detergents, Sewage treatment, Great Lakes, Ontario, Algae, International Joint Commission, Carbon, Nitrogen, Phosphorus, Bicarbonates, Agricultural runoff, Lake Erie, Lake Ontario, Regulation, Hardness (Water), Feasibility, Nitrilotracetic acid, Economics, Public Health.
Identifiers: Canada Water Act.

Recognizing that nutrients, particulary phosphates, are the major contributors to eutrophication, the Advisory Boards to the International Joint Commission recommended an extensive program of nutrient discharge control, the most important step being control of phosphate discharges to the lower Great Lakes, with means of achieving the objective. An effective program to control phosphates must have three principal aims: reduction and eventual removal of phosphates from detergents, removal of phosphates and possibly other nutrients at waste treatment plants, and control of phosphates from agricultural sources. In response to recommendations of the International Joint Commission, the Government of Ontario has announced a policy of nutrient removal at the larger municipalities in the lower Great Lakes drainage basin. Research on improved agricultural practices to reduce nutrient discharges in continuing. Formulation of government policy in the complex area of environmental restoration and preservation presents legislators with the difficult problem of appraising often conflicting interpretations of research information. Involved are important considerations of economics, public health, and public interest. Task of providing information on which policy can be built, and providing it in a form relatively easy to assimilate, falls to economists and social scientists and their colleagues in natural sciences. (See also W74-01798) (Jones-Wisconsin)
W74-01809

HYBRIDIZATION STUDIES OF BLUE-GREEN ALGAL AND HIGHER PLANT CHLOROPLAST DNA,
Hospital for Sick Children, Toronto (Ontario). Div. of Biochemistry Research.
S. D. Kung.
Federation of European Biochemical Society, Vol 29, No 3, p 259-262, 1973. 2 fig, 1 tab, 14 ref.

Descriptors: *Chlorophyll, *Cyanophyta, *Biochemistry, Physicochemical properties, Bacteria, Genetics, Plant morphology.
Identifiers: *Dioxyribonucleic acid, *Chloroplast DNA, *Hybridization studies, Lyngbya, Bacillus subtilis.

There is considerable evidence from some comparative studies of RNA and proteins supporting the hypothesis that chloroplasts originated from blue-green algae. Evidence obtained by DNA-DNA hybridization studies between a blue-green alga and higher plant chloroplasts is presented which indicates some degree of base sequence homology. DNA's from broad bean chloroplasts and Lyngbya were prepared and characterized. In the hybridization experiments, an equal amount of chloroplast and Lyngbya DNA, and Lyngbya and Bacillus subtilis DNA were mixed and annealed together. The hybrid formed was detected by its position in the analytical ultracentrifuge after banding in a CsCl density gradient. Hybrid formation with different densities suggests that these hybrids either have different proportions of double and single stranded regions, and/or have different lengths of chloroplast and blue-green algal DNA. Nevertheless, formation of such hybrids suggests that chloroplast and Lyngbya DNA have some nucleotide sequences in common. Although the density gradient technique used in this study is not quantitative, it does allow visualization of the hybrid formation. Evidence suggesting qualitative partial homology between chloroplast (broad bean) and blue-green algal (Lyngbya) DNA is presented. (Jones-Wisconsin)
W74-01810

IMMUNOLOGICAL IDENTIFICATION OF PIGMENT COMPONENT OF A PHOTOCHEMICALLY ACTIVE CHROMOPROTEIN (ACP) ISOLATED FROM THE BLUE-GREEN ALGA ANABAENA CYLINDRICA,
Tokyo Univ. (Japan). Ocean Research Inst.
C-J. Pjon, and Y. Fujita.
Plant and Cell Physiology, Vol 14, No 1, p 201-205, 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Plant pigments, *Biochemistry, *Photoactivation, *Cyanophyta, Anabaena.
Identifiers: *Immunology, *Chromoprotein, Anabaena cylindrica, Phycocyanin.

An attempt to identify the immunology of c-phycocyanin as a component of the photochemically active chromoprotein (ACP) is described. ACP and phycocyanin, which had been isolated from Anabaena cylindrica, were used as antigens. Antisera were obtained by immunizing rabbits with complete Freund's adjunant. Anti-ACP did not inhibit ascorbate photooxidation when the reaction mixture contained the antigen-antibody complex. When the complex was removed from the reaction mixture photochemical activity disappeared. The small molecular size of ascorbate would allow it to reach the active site of ACP by passing through a geometrical barrier formed by the antigen-antibody complex. Results indicate that anti-ACP does not contain any antibodies which attack the active site of ACP. The antibody which reacted only with the ACP preparation may not be an ACP-antibody, but a contaminant in the ACP preparation. If it is a contaminant, then ACP can induce only the formation of the phycocyanin antibody. The fact that the complex formation between ACP and anti-ACP or anti-phycocyanin did not affect the photochemical activity or fluorescence characteristics of ACP, suggests that all components acting in the photochemical reaction are located in the inner part of the pigment complex. (Auen-Wisconsin)
W74-01811

CHARACTERISTICS OF NITRATE REDUCTION IN A MUTANT OF THE BLUE-GREEN ALGA AGMENELLUM QUADRUPLICATUM,
Texas Univ., Port Aransas. Inst. of Marine Science.
S. E. Stevens, Jr., and C. Van Baalen.
Plant Physiology, Vol 51, No 2, p 350-356, 1973. 6 fig, 3 tab, 31 ref.

Descriptors: *Nitrification, *Biochemistry, *Cyanophyta, Nitrates, Growth rates, Cytological studies, Plant pigments, Nitrogen, Photosynthesis.
Identifiers: *Mutant, *Agmenellum quadruplicatum.

Results of a beginning study of connection between photosynthesis and nitrate reduction are reported. Characteristics of nitrate reduction in terms of nitrite production in an N-methyl-N'-nitro-N-nitrosoguanidine-induced mutant of blue-green alga Agmenellum quadruplicatum are described. Following induction of nitrate reduction linear rate of nitrite production proportional to cell concentration was observed. Nitrite production rate and growth rate showed similar response to pH, temperature, and light intensity. Results do indicate in a substantial way that the reduction of nitrate to nitrite can be accomplished by a partial reaction of photosynthesis. A partial reaction of photosynthesis has the meaning that total throughput from the oxidation of water to the production of ATP and NADPH is not required. The deduction that at most only a partial reaction

photosynthesis is required rests on the observa-
ns of very low requirement for carbon dioxide
ation, drastic reduction in c-phycocyanin con-
t which does not affect nitrate reduction, large
crease in photosynthesis in terms of oxygen
oduction without concomitant decrease in
rate reduction, inhibition of photosystem II by
CMU or UV irradiation without significant ef-
t upon the early rate of nitrite production, and
action spectrum of nitrate reduction. (Jones-
sconsin)
74-01812

LIMNOLOGICAL SURVEY OF THE FRESH-
ATER COASTAL LAKES OF EAST GIPP-
AND, VICTORIA,
onash Univ., Clayton (Australia). Dept. of
ology.
V. Timms.
stralian Journal of Marine and Freshwater
search, Vol 24, No 1, p 1-20, 1973. 5 fig, 8 tab,
ref, 2 append.

scriptors: *Baseline studies, *Limnology,
akes, *Australia, Geomorphology, Physical
operties, Chemical properties, Aquatic plants,
oplankton, Invertebrates, Littoral, Benthos,
h, Forebays, Alkaline water, Daphnia, Acidic
ter, Isopods, Color, Light penetration,
drogen ion concentration, Lagoons, Annelids.
entifiers: *East Gippsland (Australia), Victoria
ustralia), Lake Elusive (Australia), Lake Bar-
coota (Australia), Boeckella minuta, Thermo-
clops hyalinus, Daphnia lumholtzi, Calamoecia
manica, Gladioferens spinosus, Queensland
ustralia), Sand dune lakes, Boccardia.

neral limnological features of 11 of the larger
d more accessible lakes in East Gippsland, Aus-
lia are reported with information given on
ysiography, major physical and chemical fea-
es, macrophytes, zooplankton, littoral inver-
rates, benthos, and fish. Detailed morphomet-
maps were prepared for Lakes Elusive and
rracoota. In Lake Beadle the littoral is
minated by the emergent Eleocharis sphacelata.
her emergents include Baumea articulatum,
pidosperma longitudinale, and Triglochin
ocera. At least 27 zooplankton species occur in
lakes. Among the copepods Boeckella minuta
he most common in the floodplain lakes around
bost, and Calamoecia tasmanica in the coastal
ne lakes. In Lake Barracoota Gladioferens
nosus is the only plankter recorded, and curi-
sly it could be caught only at night. The cyclo-
id copepods are world-wide forms and common
eastern Australia. The four floodplain lagoons
alkaline, dominated by sodium and bicar-
nate ions. Zooplankton in each consists of
eckella minuta, Thermocyclops hyalinus,
phnia lumholtzi and other entomostracans. The
astal dune lakes are acid, dominated by sodium
d chloride ions and contain one to three
oplankton species, including Calamoecia
manica. Lake Barracoota's recent marine origin
confirmed by the presence of two isopods and a
lychaete with marine affinities. (Jones-Wiscon-
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74-01813

OPHIC DYNAMICS AND NICHES OF SALT
ARSH FORAMINIFERA,
ty Coll., New York. Dept. of Biology.
J. Lee, and W. A. Muller.
nerican Zoologist, Vol 13, No 1, p 215-223, 1973.
ig, 6 tab, 45 ref.

scriptors: *Energy transfer, *Benthos, *Salt
rshes, *Biological communities, Dynamics,
ches, Respiration, Littoral, Productivity,
omass.
entifiers: *Foraminifera, Allogromia laticollaris,
salina leei, Spiroloculina hyalina.

Trophic dynamics and energy of foraminifera whose niches are best known were studied to clarify two differing concepts: that among detritus-algae feeders only a few important species exist, all having very unrestricted diets, and that a more efficient pathway to community stability is achieved through many species, each with restricted diets. Three species of littoral benthic foraminifera, Allogromia laticollaris, Rosaline leei, and Spiroloculina hyalina, were grown in the laboratory. Algal biomass eaten was determined by measuring the volumes of 100 individual logarithmically growing algae cells. Log phase cells were chosen for measurement since they were used in the tracer feeding studies. In view of the high standing crops, turnover of species, and high ecological growth efficiency of salt marsh foraminifera, it is clear that they can play a significant role in the carbon budget and nutrient cycling within the detritus microbial assemblages of salt marshes. It seems reasonable to believe that stability and high rates of productivity in the microbial and micrometazoan assemblages of salt marshes are achieved through species diversity. (Jones-Wisconsin)
W74-01814

PLANKTON SUCCESSION IN A NEWFOUNDLAND LAKE,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
C. C. Davis.
Internationale Revue der Gesamten Hydrobiologie, Vol 57, No 3, p 367-395, 1972. 20 fig, 4 tab, 22 ref.

Descriptors: *Dominant organisms, *Plankton, *Succession, *Systematics, Lakes, Temperature, Phytoplankton, Zooplankton, Dinoflagellates, Benthic flora, Copepods, Ice cover, Coliforms, Rotifers, Anabaena, Nannoplankton, Cyanophyta, Chrysophyta, Diatoms, Pyrrophyta, Chlorophyta, Chlorella, Chlamydomonas, Protozoa, Crustaceans, Daphnia.
Identifiers: *Newfoundland (Hogan's Pond), Boreal lakes.

Hogan's Pond was investigated to supplement the meager information on freshwater plankton in Newfoundland's boreal lakes. It is an average sized lake, particularly interesting because Lake Erie whitefish (Coregonus clupeaformis) were planted in it in 1886, and still exist. Regular collecting trips were attempted every two weeks during June 1969 to October 1970 over the deepest spot in the lake. Qualitative plankton samples were obtained. Zooplankters were counted as individuals except for the colonial rotifer Conochilus unicornis which was recorded as number of colonies, with rough estimates of individuals per colony. For the most part the number of phytoplankton cells was counted, but with some forms this was not feasible; in such cases, number of sections of the filaments containing approximately 50 cells were estimated. Highest temperatures were attained in July-August, maximum being 18C in 1969 and 21.9C in 1970. Of the phytoplankton, details of Cyanophyta, Chrysophyta--Bacillariophyceae, Pyrrophyta, Chlorophyta, and phytoflagellates are given, including seasonal and vertical distributions. Seasonal succession of dominant and subdominant phytoplankters are discussed. Details are given of protozoa, rotifers, Cladocera, and Copepoda with the seasonal distributions of their various stages. (Jones-Wisconsin)
W74-01818

THE PHYTOTOXICITY OF CRUDE OIL SPILLS IN FRESHWATER,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
T. C. Hutchinson, P. Kauss, and M. Griffiths.
Water Pollution Research in Canada, Vol 7, p 52-58, 1972. 6 fig, 6 tab, 19 ref.

Descriptors: *Toxicity, *Plant growth, *Oil spills, *Freshwater, Plankton, Algae, Acidity, Hydrogen ion concentration, Productivity, Water pollution effects, Chlorella.
Identifiers: Crude oil, Benzene, Toluene, Xylene, Chlorella vulgaris, Dinobryon, Peridinium, Tabellaria, Ankistrodesmus spiralis, Ankistrodesmus falcatus, Fragillaria, Chlorococcum.

Not only are high seas and continental shelves affected by oil spills, inland fresh waters, including lakes and rivers, are also being subjected to increased quantities of hydrocarbons, not least from untreated domestic and industrial wastes. Field and laboratory experiments were conducted to determine toxicity of crude oil, crude oil-water extracts, and selected oil components to planktonic algae. In the field, species differed markedly in response to an oil spill: Some were inhibited, others actually stimulated, while a third group was unaffected. The results emphasize the differences in response between species and suggest the actual planktonic composition of a water body is important in predicting oil spill effects. In the laboratory, aqueous extracts of 7 crude oils showed inhibitory effects but differed in degree of toxicity. This toxicity appeared to be reduced by volatilization of the toxic components. Oil extracts showed marked decreases in pH which were sufficient to cause a considerable suppression of algal growth, but when pH changes were artificially eliminated the aqueous extracts of oil still contained toxic properties. Benzene, toluene and xylene showed toxic properties. Cells generally could resume growth when the toxic factor was removed. (Jones-Wisconsin)
W74-01820

CADMIUM AND ZINC TOXICITY AND SYNERGISM TO FLOATING AQUATIC PLANTS,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
T. C. Hutchinson, and H. Czyrska.
Water Pollution Research in Canada, Vol 7, p 59-65, 1972. 6 fig, 4 tab, 9 ref.

Descriptors: *Cadmium, *Zinc, *Floating plants, *Absorption, *Toxicity, Food chains, Industries, Mining, Pesticides, Fertilizers, Plant growth.
Identifiers: Synergism, Lemna valdiviana, Salvinia natans.

Experiments were designed to test relative toxicity of cadmium to floating aquatic plants, determine whether toxicity is related to actual uptake by the plants, assess potential concentration factor of cadmium in aquatic plants compared with water levels, determine effect of competitive stress on cadmium toxicity, and investigate possible Cd/Zn synergism. Lemna valdiviana and Salvinia natans were used as experimental material. They reproduce vegetatively to produce a floating photosynthetic mat on the water surface. Growth can be determined readily in terms of number of leaves or fronds, since each leaf has a finite size. Both species were found to accumulate the metals, from even very low levels in solution. Cadmium at 0.01 ppm had an inhibitory effect on growth and 0.1 ppm caused death. A concentration factor of up to 9500 times occurred. There were clear implications of potential food chain effects. Cadmium and zinc acted synergistically together. Zinc markedly increased the inhibitory effect of cadmium even though it was itself stimulatory. The presence of one metal also increased the uptake of the other. (Jones-Wisconsin)
W74-01821

THE EQUILIBRIUM AND STABILITY OF SIMPLE MARINE BIOLOGICAL SYSTEMS. I. PRIMARY NUTRIENT CONSUMERS,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
O. M. Phillips.

The American Naturalist, Vol 107, No 953, p 73-93, 1973. 5 fig, 8 ref.

Descriptors: *Biological communities, *Equilibrium, *Stability, *Oceans, Ecosystems, Nutrients, Mathematical studies, Phytoplankton, Primary productivity.
Identifiers: *Primary consumers.

The general interactions among species of primary nutrient users competing for these nutrients in a homogeneous marine biological system are mathematically analyzed to determine exactly which properties of the functions concerned are necessary to assure system maintenance either in an equilibrium state or in a state with cyclic, possibly large-amplitude, oscillations. Conditions for equilibrium are, in absence of predation, the number of removable nutrients must be greater than or equal to number of primary consumer species and for each species involved there must be at least one domain of values of the removable nutrients in which this population alone can grow, all others dying out. Stability of an equilibrium state is studied in general and two examples are given in detail, one involving a single limiting nutrient and one species, the other with two limiting nutrients and one species. If population density is limited by toxic agents, equilibrium is generally unstable; instability can also be provoked by sufficiently strong cross-linkage in which assimilation rate of one nutrient depends strongly on concentration of another. Specific criteria for stability are presented: they generally depend on the forms of population growth rates and assimilation rates as functions of the concentrations involved. (Jones-Wisconsin)
W74-01822

EFFECTS OF SOME METABOLIC INHIBITORS ON HETEROCYST FORMATION IN THE BLUE-GREEN ALGA, ANABAENA DOLIOLUM,
Udaipur Univ. (India). Dept. of Botany.
V. V. S. Tyagi.
Annals of Botany, Vol 37, No 150, p 361-368, 1973. 9 fig, 19 ref.

Descriptors: *Nitrogen fixation, *Plant growth regulators, *Inhibitors, *Cyanophyta, Anabaena, Carbon, Photosynthesis, Plant physiology, Cytological studies, Respiration.
Identifiers: *Heterocysts, Anabaena doliolum, Adenosine triphosphate, 3,p-chlorophenyl dimethylurea, 2,4-dinitrophenol, Sodium azide, Maleic hydrazide, Iodoacetic acid.

Extensive studies on functional aspects of heterocysts aimed at the localization of nitrogenase activity have not resolved the problem of heterocyst nitrogen gas fixation. An alternative approach was the study of physiological conditions controlling heterocyst formation. Selected metabolic inhibitors--3,p-chlorophenyl dimethylurea (CMU), 2,4-dinitrophenol (DNP), sodium azide, maleic hydrazide (MH), and iodoacetic acid were used mainly with a view of discovering the relative role of photosynthesis and respiration in heterocyst formation. Non-heterocystous filaments, 1-week old, were used as the experimental material. CMU, DNP, iodoacetic acid, and sodium azide inhibit heterocyst formation, whereas maleic hydrazide does not. Glucose promotes the frequency of heterocysts and is very effective in counteracting the inhibition by CMU and sodium azide. The DNP inhibition is not reversed by glucose but adenosine triphosphate (ATP) causes a partial reversal. The iodoacetic acid inhibition is reversed partialiy by pyruvic acid; ATP and glucose are ineffective in this case. Red light increases heterocyst frequency; green and blue lights are inhibitory. In view of the mechanisms of the activity of the inhibitors it is concluded that heterocyst formation depends on the availability of carbon intermediates and ATP. The former is supplied by photosynthesis and the latter most probably by oxidative metabolism. (Jones-Wisconsin)
W74-01823

SULPHATED POLYSACCHARIDE SYNTHESIS IN BROWN ALGAE,
Leeds Univ. (England). Dept. of Plant Sciences.
L. V. Evans, M. Simpson, and M. E. Callow.
Planta (Berl.), Vol 110, No 3, p 237-252, 1973. 25 fig, 28 ref.

Descriptors: *Phaeophyta, *Biochemistry, *Cytological studies, *Carbohydrates, Synthesis, Sea water, Plant physiology.
Identifiers: *Sulphated polysaccharides, Pelvetia canaliculata, Fucose, Laminaria, Goldi complex, England, Fucus.

Sites of synthesis, transport and subsequent location of sulphated polysaccharides in the Fucales and Laminariales were studied. Microscopy and autoradiography were used on plants selected for widely differing sulphated polysaccharide content. Brown algal carbohydrate composition is dependent on many factors; degree of exposure to air is one of the main factors determining relative amounts of sulphated polysaccharide present. Pelvetia canaliculata and Fucus spiralis, which grow high on the shore and are exposed for the longest periods have large amounts of fucoidan, while Fucus serratus, which grows low on the shore, has much less. In the Laminariales, which experience relatively little exposure to the air, sulphated polysaccharides constitute only some 5% dry weight and variation in carbohydrate composition is largely seasonal. The most rapid uptake of sulphate-35 occurred when material was incubated in a medium with 0.0001 M carrier sulphate, negligible uptake occurring from seawater. Autoradiography using sulphate-35 shows that sulphated material is synthesized by all cell types, particularly epidermal cells of Pelvetia. This activity is confined to specialized secretory cells which discharge into mucilage canals in Laminaria. In both instances the process of carbohydrate sulphation appears to occur in the Golgi-rich perinuclear region. (Jones-Wisconsin)
W74-01824

CYANOPHAGE AC-1: A PHAGE INFECTING UNICELLULAR AND COLONIAL BLUE--GREEN ALGAE,
Indian Agricultural Research Inst., New Delhi. Div. of Microbiology.
G. S. Venkataraman, B. D. Kaushik, G. Subramanian, S. Shanmugasundaram, and A. Govindarajan.
Current Science, Vol 42, No 3, p 104-105, 1973. 2 fig, 10 ref.

Descriptors: *Algae, *Cyanophyta, *Plant diseases, Viruses.
Identifiers: *Cyanophage AC-1, *India, Anacystis nidulans, Chroococcus minor.

Blue-green algal phages types SM-1 and AS-1 infect unicellular blue-green algae and C-1 and AR-1 infect heterocystous and sporulating forms. A phage newly isolated from a waste stabilization pond at the Indian Agricultural Research Institute, New Delhi is reported, which unlike the SM and AS phages, infects both the unicellular Anacystis nidulans and the colonial chroococcoid Chroococcus minor. Detailed studies have previously been published only on Cyanophages of the LPP, SM and AS types. This newest viral type, in accordance with the system of nomenclature set forth for Cyanophages, has been designated as AC-1. It was initially detected through its lysis of a laboratory culture of Anacystis nidulans, strain No. 14011, and its isolation and host range were determined. It was found to be ineffective on a number of heterocystous and non-heterocystous blue-green algal strains. Besides Anacystis nidulans, Chroococcus minor (ARM 18) was the only other alga found to be susceptible. Of the two hosts, the larger plaques were formed with C. minor. Adsorption rates were studied under conditions similar to those used in the propagation of the phage and show a linear trend. (Jones-Wisconsin)
W74-01825

THE FINE STRUCTURE OF AMOEBOAPHELIDIUM PROTOCOCCARUM GROMOV ET MAMKAEVA--AN ENDOPARASITE OF GREEN ALGA SCENEDESMUS,
Leningrad State Univ. (USSR). Biological Inst.
B. V. Gromov, and K. A. Mamkaeva.
Archiv fur Hydrobiologie, Vol 67, No 4, p 452-459, 1970. 15 fig, 19 ref.

Descriptors: *Scenedesmus, *Protozoa, *Plant diseases, *Parasitism, Algae, Cytological studies, Systematics, *Chlorophyta.
Identifiers: *Amoeboaphelidium protococcarum, Ultrastructure, Amoeba.

Amoeboaphelidium protococcarum is a parasite of the genus Scenedesmus and some other protococcous algal genera. It provides a convenient model for experimental investigations because it is not too difficult to obtain and cultivate in artificial media, solid, semisolid, or liquid, and can be isolated from natural habitats. According to recent observations, it is widely distributed in natural conditions where evidently it has a definite influence on the growth of sensitive algae; at least its development has a drastic effect on large-scale Scenedesmus cultures. From examination of several strains of parasites, the sensitivity of the given culture of Scenedesmus to the different parasites proved to be characteristic of the culture or clone, and this character seems to be useful for the description and differentiation of Scenedesmus cultures. A. protococcarum ultrastructure possesses all the organelles characteristic of an eucariotic cell. The vegetative body grows as a naked amoeba and captures host cell contents during phagocytosis. The mature body subdivides into new amoebae which leave the destroyed cell and infects new algal cells. It has some characteristics in common with lower fungi--chytrids and myxomycetes--but may represent an independent group of parasitic microorganisms. (Jones-Wisconsin)
W74-01826

LIMNOLOGICAL STUDIES ON A SOUTHEAST TEXAS MEANDER SCAR LAKE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
R. C. Harrel.
Texas Journal of Science, Vol 24, No 4, p 517-533, 1973. 8 fig, 7 tab, 12 ref.

Descriptors: *Limnology, *Texas, *Lakes, *Flood plains, *Thermal stratification, Dissolved oxygen, Hydrogen ion concentration, Carbon dioxide, Alkalinity, Turbidity, Specific conductivity, Dissolved solids, Geologic history, Benthic fauna, Vertical migration, Chlorophyta, Cyanophyta, Daphnia, Zooplankton, Biological communities, Aquatic plants, Physicochemical properties, Temperature, Secchi disks, Euglenophyta, Chrysophyta, Rotifers, Gastropods, Crustaceans, Plankton, Fish, Diptera.
Identifiers: *Massey Lake (Texas), Meander lakes, Pilecypods, Chaoborus punctipennis.

Basic physicochemical and biological data were obtained during limnological studies of Massey Lake, a southeast Texas meander scar lake during May 1967 to July 1969. Recreational aspects of flood plain lakes are increasing as the larger reservoirs become more crowded, and the rivers become more industrialized. A warm monomictic lake, Massey Lake is isothermal only during January and February. During stratification dissolved oxygen and pH decreased with depth, while carbon dioxide, alkalinity, turbidity, specific conductance, and dissolved solids increased with depth. Most of the year all but the upper 2 to 4 m

of water are anoxic. Only two species of aquatic vascular plants were observed. Collections were made of 47 benthic macroinvertebrate taxa. The dominant benthic, Chaoborus punctipennis, formed over 85% of the total number of individuals. Species diversity decreased with depth to zero at 3 m. Vertical migration was exhibited by Chaoborus which moved down as light intensity increased, and toward the surface with decreased light intensity. Green algae were dominant during colder months, while bluegreens were dominant during warm months. The most abundant zooplankton were Daphnia pulex and Kellicottia. Eighteen fish species were collected. (Jones-Wisconsin)
W74-01828

COPRECIPITATION OF PHOSPHATE WITH CARBONATES IN A MARL LAKE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 02H.
W74-01843

URBAN GROWTH AND THE WATER REGIMEN. HYDROLOGIC EFFECTS OF URBAN GROWTH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04C.
W74-01847

KINETICS OF ROTENONE-POTASSIUM PERMANGANATE REACTIONS AS APPLIED TO THE PROTECTION OF TROUT STREAMS,
New York State Dept. of Environmental Conservation, Delmar. Dept. of Aquatic Biology.
R. Engstrom-Heg.
N Y Fish Game J. Vol 19, No 1, p 47-58. 1972. Illus.
Identifiers: Kinetics, *Potassium, Protection, *Rotenone, Streams, *Trout, *Detoxification.

Rates of rotenone detoxification by KMnO4 were estimated by arresting the reaction with tannic acid and estimating rotenone residues by bioassay. At rotenone concentrations up to 50 ppb (1 ppm 5% emulsifiable product), detoxification occurs at a negative exponential rate directly proportional to the KMnO4 concentration. Other rates are characteristic of higher concentration ranges. At any given rotenone concentration, detoxification time is inversely proportional to KMnO4 concentration. Temperature has little effect on detoxification rates. Rates for given KMnO4 and rotenone concentrations are slightly slower in hard than in soft water. Colloidal rotenone in saturated or freshly prepared dispersions is more difficult to detoxify than dissolved retenone. Correction factors are given for hard water and for water containing organic material. Detoxification criteria are those for trout. Detoxification need not progress as far for centrarchids. Sodium thiosulfate may be used to treat toxic concentrations of KMnO4 in streams.--Copyright 1973, Biological Abstracts, Inc.
W74-01891

ARSENIC CONTENT OF FISH FROM NEW YORK STATE WATERS,
Cornell Univ., Ithaca, N.Y. Pesticide Residue Lab.
I. S. Pakkala, M. N. White, D. J. Lisk, G. E. Burdick, and E. J. Harris.
N Y Fish Game J. Vol 19, No 1, p 12-31. 1972. Illus.
Identifiers: *Arsenic, Fish, *New York, *Trout, Lakes, Rivers.

A survey of 471 fish sampled in 1969 from 49 New York State waters for total arsenic content is presented. Arsenic levels ranged up to about 0.5 ppm with fish from Lake Ontario, Canandaigua Lake and the Hudson, St. Lawrence and Salmon Rivers. Larger fish generally contained higher arsenic concentrations. Arsenic did not appear to be cumulative with increasing age in lake trout ranging from 2-11 yr.--Copyright 1973, Biological Abstracts, Inc.
W74-01900

STAGES OF DEVELOPMENT OF YOUNG SALMON IN THE CHAIKEND SALMON-BREEDING FACILITY, (IN RUSSIAN),
For primary bibliographic entry see Field 08I.
W74-01901

SEDIMENTATION OF SUSPENDED MATTER BY DREISSENA POLYMORPHA PALLAS AND ITS SUBSEQUENT UTILIZATION BY CHIRONOMIDAE LARVA,
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
E. I. Izvekova, and A. A. Lvova-Katchanova.
Pol Arch Hydrobiol. Vol 19, No 2, p 203-210. 1972.
Identifiers: Bacteria, *Chironomidae, Chironomus-Anthracinus, *Dreissena-Polymorpha, Endochironomus-Albipennis, Larvae, Potamogeton-Sp, *Sedimentation, Suspended matter, *USSR (Uchnskoye), Reservoirs.

During the summer months in the Uchnskoye water reservoir, USSR, D. polymorpha Pallas excretes 48.8 tons dry weight per day of the agglutinated seston in the form of feces and pseudofeces. The possibility of utilization of this matter by Chironomidae larvae (Endochironomus albipennis Mg. and Chironomus anthracinus Zett.) was investigated. Newly born larvae were kept until the third instar on various food which was agglutinated or not by D. polymorpha, such as natural suspended matter, mud and detritus originating from Potamogeton sp. Pseudofaeces of D. polymorpha were richer in bacteria than the original seston. The suspended matter agglutinated by D. polymorpha was the most valuable food source for Chironomidae larvae.--Copyright 1973, Biological Abstracts, Inc.
W74-01904

REPORT ON OSCILLATORIA (SUBGENUS SPIRULINA) PLANTENSIS (NORDST.) BOURRELLY (CYANOPHYTA) IN CHAD, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).
A. Iltis.
Cah O R S T O M (Off Rech Sci Tech Outre-Mer) Ser Hydrobiol. 5 (1): 53-72. Illus. 1971. (English summary).
Identifiers: Africa (Equatorial), *Chad, *Cyanophyta, Food, Human, Oscillatoria-Platensis, Salinity, Spirulina, Subgenus, Algae, Lakes.

Oscillatoria platensis is found in Chad (Equatorial Africa) in the temporary or permanent natroned waters located on the one hand directly at the northeast of the Chad Lake (Kanem), on the other hand at the northeast of Largeau (Borkou). This alga reaches great densities, particularly in permanent lakes having a high saline concentration (30 to 40 g/l). In the temporary ponds, flooded during more than 3-4 mo., O. platensis develops, but the densities, particularly in permanent lakes having a high saline concentration (30 to 40 g/l). In the temporary ponds, flooded during more than 3-4 mo., O. platensis develops, but the densities are less and the proportion of alien organisms is generally more important. A very localized part of the Chad population reaps and utilizes for food this cyanophyte. This one is used in the making of sauces and the amounts ingested daily are rather small. The percentage of proteins is equal or exceeds 50% of the weight of dry matter. The present information is yet very incomplete particularly about biology of this species and its capacity of production in the different natural natroned media in Chad.--Copyright 1973, Biological Abstracts, Inc.
W74-01905

OYSTER DRILL (OCINEBRA JAPONICA) CONTROL,
Washington State Dept. of Fisheries, Olympia.
For primary bibliographic entry see Field 05G.
W74-01917

SIGNIFICANCE OF CELLULOSE PRODUCTION BY PLANKTONIC ALGAE IN LACUSTRINE ENVIRONMENTS,
Massachusetts Univ., Amherst. Water Resources Research Center.
J. Rho, T. Reynolds, and W. Litsky.
Available from the National Technical Information Service as PB-225 542/0 $4.25 in paper copy, $1.45 in microfiche. Completion Report, November, 1972. 100 p, 15 fig, 15 tab, 109 ref. OWRR B-006-MASS (2).

Descriptors: *Phytoplankton, *Cellulose, *Aquatic algae, *Aquatic environment, Lakes, Chlorophyta, Chrysophyta, Pyrrophyta, Eutrophication, Oligotrophy, Dystrophy, Ponds, Carbohydrates, Dinoflagellates, Plant tissues, Vascular tissues, Bodies of water.
Identifiers: *Fate of pollutants, Particulate matter, Vertical distribution, Absorption spectra.

Numbers and type of cellulose-containing algae were observed in an eutrophic pond, a dystrophic pond and an oligotrphic lake. The cellulose-containing algae, members of Chlorophyceae, Dinophyceae and Chrysophyceae, were estimated to be approximately 70 percent of the total phytoplankton population observed. Fourteen algal species representing the dominant cellulose-containing phytoplankton were investigated for cellulose content which accounted for 2-39 percent on a dry weight basis of the cells studied. The amounts of cellulose present in the water column ranged from 110-1,185 micrograms/1, which accounted for 4-50 percent of the total dry weight of particulate matter. A comparison of adsorption spectra of the extracts from algae, higher plants, particulate matter from bodies of water studied and purified cellulose, indicated that the cellulosic material present in particulate matter was of algal origin. It was estimated that less than 30 percent of cellulose in the water column was actually contributed by the viable algal cells present aat the time of sampling. There was more cellulose found in the water column than could be accounted for by the number of algal cells observed.
W74-01927

ACIDOPHILIC THIOBACILLI IN THE RIVER SIRPPUJOKI,
Helsinki Univ. (Finland). Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01946

BACTERIOLOGICAL STUDIES ON GRAVEL PIT LAKES (BAKTERIOLOGISCHE UNTERSUCHUNGEN AN BAGGERSEEN),
For primary bibliographic entry see Field 05A.
W74-01976

DISTRIBUTION PATTERN OF STREPTOMYCETES FROM FLOODED GANGES WATER,
S. K. Batra, M. Srivastava, and H. V. Sahni.
Indian J Exp Biol. Vol 10, No 6, p 439-441. 1972.
Identifiers: Classification, *Distribution patterns, Floods, Fusarium-oxysporum, *India (Ganges), Morphology, Mycelium, Pentaene, Polyene antibiotics, Saccharomyces-cerevisiae, *Streptomycetes, Water pollution.

Color, morphology and antagonism were used in grouping 607 isolates of streptomycetes from flooded Ganges River, India water. The majority were of the gray color series. The ability to produce melanin was quite widespread except in isolates with yellow and green aerial mycelium. Spira and retinaculum-apertum morphology was

most predominant in all color groups. In the yellow color series the 2 morphological groups, retinaculum-apertum and spira and straight to flexuous, occur in almost equal proportions. Fusarium oxysporum was antagonized by 12.8% of isolates and Saccharomyces cerevisiae by 15.4%. Polyene antibiotic producers numbered 29.6% and the majority produced pentaenes. All isolates with biverticillate morphology were polyene antibiotic producers.--Copyright 1973, Biological Abstracts, Inc.
W74-01980

UREA AND OTHER NITROGENOUS NUTRIENTS IN LA JOLLA BAY DURING FEBRUARY, MARCH AND APRIL 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05B.
W74-01993

EFFECT OF ARTEFACT POLLUTION ON THE VIABILITY OF SEABIRD COLONIES ON LONG ISLAND, NEW YORK,
American Museum of Natural History, New York. Dept. of Ornithology.
M. Gochfeld.
Environ Pollut. Vol 4, No 1, p 1-6. 1973.
Identifiers: Birds, Breeding, Chemical contamination, Destruction, Food, Habitat, Mortaility, *New York (Long Island), Pollution, Viability, *Seabird colonies.

Colonies of several species of seabirds and freshwater birds persist on Long Island, even in close proximity to metropolitan New York City. Habitat destruction, chemical contamination of water and food sources and direct interference by humans pose the main hazards to these birds. Efforts were made to minimize the impact of such well-known distrubances. In certain areas, the colonies seem to be thriving. Studies of breeding success and mortality revealed that human artefacts such as trash scattered on the beaches or jetsam washed ashore may contribute significantly to the mortality of certain species. This is a readily controllable form of environmental contamination which involves no philosophical or economic conflicts.--Copyright 1973, Biological Abstracts, Inc.
W74-02001

ENVIRONMENTAL POLLUTION, A SURVEY EMPHASIZING PHYSICAL AND CHEMICAL PRINCIPLES,
Iowa State Univ., Ames. Dept. of Physics.
For primary bibliographic entry see Field 05B.
W74-02002

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Report No. Docket 50334-80, $7.60 per copy, $1.45 microfiche. Report No. Docket 50334-80, July 1973. 301 p, 19 fig, 40 tab, 76 ref, 3 append.

Descriptors: *Ohio River, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, *Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Pennsylvania.
Identifiers: *Pressurized water reactors, *Environmental Impact Statements.

The Beaver Valley Power Station Unit 1 is located on the Ohio River near Shippingport in Beaver County, Pennsylvania. The facility utilizes a pressurized water reactor with waste heat disposal accomplished through the use of a closed-cycle natural-draft cooling tower. This final environmental statement relates to the proposed continuation of the construction permit and the issuance of an operating license for the Beaver Valley Power Station, Unit 1. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permit and issue an operating license for the facility subject to the following conditions: (1) Augment the preoperational radiological monitoring program. (2) Define certain comprehensive environmental monitoring programs for inclusion in the technical specifications - these to consider aquatic organism, residual chlorine and chloramine, thyroid dose, and herbicides. (3) Provide plans to minimize any irreversible damage seen or expected. (See also W74-02005) (Houser-ORNL)
W74-02004

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Report No. Docket 50412-25, $7.60 per copy, microfiche. Report No. Docket 50412-25, July 1973. 310 p, 23 fig, 39 tab, 80 ref, 3 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, *Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Ohio River, *Pennsylvania.
Identifiers: *Pressurized water reactors, *Environmental Impact Statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction of the Beaver Valley Power Station, Unit 2. This station will be located on the Ohio River near Shippingport in Beaver County, Pennsylvania, and will utilize a pressurized water reactor. The disposal of waste heat is accomplished through the use of a closed-cycle, natural-draft cooling tower. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue a construction permit for the facility subject to the following conditions: (1) Augment present Radiological Monitoring Program to obtain precise background data. (2) Reduce iodine releases to less than 5 millirems/year. (3) Comply with federal and state regulations for use of herbicides on transmission line right-of-way. (4) Implement a monitoring program to determine detrimental effects and supply a plan of action against any such effects detected. (See also W74-02004) (Houser-ORNL)
W74-02005

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF TROJAN NUCLEAR PLANT.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Report No. Docket 50344-66, $10.60 per copy, $1.45 microfiche. Report No. Docket 50344-66, August 1973. 376 p, 51 fig, 52 tab, 172 ref, 13 append.

Descriptors: *Oregon, *Columbia River, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, *Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Milk, Archaelogy.
Identifiers: *Pressurized water reactors, *Environmental Impact Statements.

The Trojan plant is located in the state of Oregon, Columbia County, on the Columbia River upstream from Rainier, Oregon. It will employ a single pressurized water reactor cooled by a natural draft cooling tower. Makeup water will be taken from the Columbia River and a very small portion of the water returned to the river. This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed continuation of construction permit and issuance of an operating license for the Trojan Nuclear Plant. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permit and issue an operating license subject to the following conditions: (1) No impingement upon areas of archeological interest. (2) Follow environmental criteria for transmission system. (3) Monitor aspects of intake pumping and aquatic ecology. (4) Comply with appropriate water-quality standards. (5) Include milk sampling in Radiological Monitoring Program. (6) Maintain awareness of grazing of cows. (7) Comply with technical specifications. (Houser-ORNL)
W74-02006

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis.
D. W. Evans.
Available from NTIS, Springfield, Va., as RLO-2227-T-12-38; $5.45 in paper copy, $1.45 in microfiche. Report RLO-2227-T-12-38, June 1973. 65 p, 6 fig, 5 tab, 37 ref, 3 append.

Descriptors: *Columbia River, *Radioisotopes, *Suspended solids, *Leaching, Estuarine environment, Zinc radioisotopes, Colloids, Tracers, Public health, Path of pollutants, Cation exchange, Mixing, Sediments.
Identifiers: Manganese radioisotopes.

Radionuclide desorption from suspended solids in the Columbia River estuary is important both for biological availability and for tracing stable-element reactions. Desorption resulted only with radionuclides in cationic form (Zn65 was 15-45% desorbed; Mn54, 30-60%) and not with anionic or uncharged forms (Cr51, Sc46, and Sb124). There was no evidence of precipitation reactions of radionuclides or of absorption reactions as a consequence of mixing of river water and seawater within the estuary. Possible reasons that Zn65 desorption was greater from suspended solids than

rom bottom sediments are: (1) larger surface-to-olume ratio, (2) greater content of clay hytoplankton and suspended algae, and (3) less ging. (Bopp-ORNL)
W74-02012

HE MONITORING OF TRITIUM IN THE QUATIC ENVIRONMENT OF POWER REAC-ORS,
adiation Management Corp., Philadelphia, Pa.
or primary bibliographic entry see Field 05B.
V74-02015

NALYSIS FOR TRITIUM IN WATER: INTER-OMPARISON STUDY OF NOVEMBER 1970,
nalytical Quality Control Service, Winchester, lass.
or primary bibliographic entry see Field 05B.
V74-02016

RITIUM RELEASES FROM NUCLEAR OWER STATIONS,
lational Environmental Research Center, Cincin-ati, Ohio.
or primary bibliographic entry see Field 05B.
V74-02017

NVIRONMENTAL TRITIUM CONTAMINA-ION FROM NUCLEAR POWER PROGRAM,
habha Atomic Research Centre, Bombay (India). lealth Physics Div.
or primary bibliographic entry see Field 05B.
V74-02018

RITIUM GENERATION AND RELEASE TO N-PLANT AND OFF-SITE ENVIRONS OF THE A CROSSE BOILING WATER REACTOR,
airyland Power Cooperative, LaCrosse, Wis.
or primary bibliographic entry see Field 05B.
V74-02019

NVIRONMENTAL TRITIUM SURVEILLANCE OR PROJECT RULISON,
lational Environmental Research Center, Las egas, Nev.
or primary bibliographic entry see Field 05B.
V74-02020

XPERIMENTAL RESULTS FROM ROCESSING GASBUGGY GAS IN A NATU-AL GAS PROCESSING PLANT,
ak Ridge National Lab., Tenn.
or primary bibliographic entry see Field 05B.
V74-02021

NVIRONMENTAL TRITIUM STUDIES AT A WR POWER PLANT,
ew York Univ. Medical Center, N.Y.
or primary bibliographic entry see Field 05B.
V74-02022

RITIUM INTAKE IN NEW YORK,
ew York Operations Office (AEC), N.Y. Health nd Safety Lab.
or primary bibliographic entry see Field 05B.
V74-02023

RADIOTRACER TECHNIQUE FOR THE STUDY IN VIVO OF THE BIOLOGICAL PATHWAY OF HEAVY METALS IN AQUATIC ORGANISMS,
European Atomic Energy Community, Ispra (Ita-y). Joint Nuclear Research Center.
F. Girardi, M. Merlini, C. Bigliocca, G. Pozzi, and A. Berg.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016. In: Nuclear Techniques in Environmental Pollution, Vienna; International Atomic Energy Agency, p 721-733, 1971. (STI/PUB-268; CONF-701023).

Descriptors: *Radioisotopes, *Animal metabolism, *Fish, *Water pollution effects, Food chains, Public health, Radioactivity effects, Path of pollutants, Tracers, Radioactivity techniques, Computer programs, Data processing, Instrumentation, Radioecology, *Heavy metals.
Identifiers: *Mercury radioisotopes.

Preliminary results are reported of a study of Hg uptake by fish using Hg-203 as a tracer. Biological pathways during absorption were studied by means of a collimated detector. Radioactivity mappings both of the whole animal and of discrete organs were obtained by a system which is still in the developmental stage. An automated gamma-ray spectrometer is used for multi-tracer experiments. Direct connection with an IBM 360/65 computer speeds analysis. (Bopp-ORNL)
W74-02025

RADIONUCLIDES IN ECOSYSTEMS.
For primary bibliographic entry see Field 05B.
W74-02046

STABLE MANGANESE AND MANGANESE-54 DISTRIBUTIONS IN THE PHYSICAL AND BIOLOGICAL COMPONENTS OF THE HUDSON RIVER ESTUARY,
New York Univ. Medical Center, N.Y.
For primary bibliographic entry see Field 05B.
W74-02048

ACCUMULATION OF SOLUBLE AND PARTICULATE RADIONUCLIDES BY ESTUARINE FISH,
National Marine Fisheries Service, Beaufort, N.C.
For primary bibliographic entry see Field 05B.
W74-02049

RESPONSE OF BLUE-GREEN ALGAE TO TECHNETIUM,
Texas Univ., Port Arkansas. Inst. of Marine Science.
P. J. Gearing, C. Van Baalen, and P. L. Parker.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971. Oak Ridge Tennessee, p 857-865. (1971) 3 fig, 8 tab, 18 ref. (CONF-710501).

Descriptors: *Marine algae, *Cyanophyta, *Water pollution effects, *Toxicity, Chemicals, Absorption, Cytological studies, Biochemistry, Radioecology.
Identifiers: *Technetium.

Technetium, a missing element on the earth, has chemical properties similar to the biologically important elements manganese and molybdenum. Technetium-99 as pertechnetate has a specific chemical effect on the blue-green algae Agmenellum quadruplicatum, Coccochloris elabens, and Anacystis nidulans. All three species behave similarly toward the ion, the only difference being in their relative sensitivities. A fraction of the algal cell population is killed upon initial exposure to pertechnetate, in the light. While the lethal concentration (about that of bromide in the ocean) may never be reached in an actual ecosystem, this completely artificial element which appears to be biologically active provides a unique tool for the study of the impact of a 'unique' pollutant on ecosystem. (See also W74-02046) (Bopp-ORNL)
W74-02050

SERUM ELECTROLYTES AND SKELETAL MINERALIZATION IN HARD- AND SOFT--WATER AREAS,
T. W. Anderson.
Can Med Assoc J. Vol 107, No 1, p 34-37, 1972. Illus.
Identifiers: *Canada (Ontario), Cardiovascular disease, *Electrolytes, *Hard water, Mineralization, Serum levels, *Soft water, *Calcium, Magnesium, *Water supply, Municipal water.

Serum levels of Ca and Mg were measured in 2 Ontario (Canada) cities that differ widely in the hardness of their local water supply. The hypothesis being tested was that residents of the city with the hard water supply (and a low cardiovascular death rate) would show relatively high serum levels of Ca and/or Mg. In addition, a comparison was made of the cortical thickness of the second metacarpal bone in the 2 areas to see if there was any evidence of increased skeletal mineralization in the hard water area. The results obtained did not support either of these hypotheses, but failure to demonstrate differences in body-levels of Ca or Mg may not be incompatible with 1 (or both) of these water-borne elements functioning as the 'water-factor' in cardiovascular disease.--Copyright 1973, Biological Abstracts, Inc.
W74-02053

EFFECT OF IONIZING RADIATION ON THE ORGANISM. THE EFFECT OF RADIOACTIVE WATER POLLUTION ON THE REPRODUCTION OF COMMERCIAL FISHES.

Available from NTIS, Springfield, Va., as AEC-tr-7418; $7.60 in paper copy, $1.45 in microfiche. Trans. of Trudy Polyar Nauck Issled, 1971. AEC Translation 7418, 1971. 182 p.

Descriptors: *Radioactivity effects, *Embryonic growth stage, *Salmon, *Water pollution effects, Cytological studies, Nuclear wastes, Strontium radioisotopes, Resistance, Temperature, Fisheries, Fish physiology, Fish diseases.

Eleven papers of this collection describe radiation effect studies at Leningrad University on salmon embryogenesis; 4 papers are by other Russian workers related topics. At 20 microCuries/liter Sr90 in seawater, but not at lower levels, effects were noted that may have a lethal outcome (although effects were not immediately lethal, and impairments in form-shaping processes were insignificant). It is considered that the low temperatures at which salmon embryogenesis occurs may aid cell-repair mechanisms. As the radioactivity of the water increased from 0.06 to 20 microCuries/liter, pathological blood cells increased from 6 to 29%. (See W74-02060 thru W74-02069) (Bopp-ORNL)
W74-02059

ACCUMULATION OF RADIOACTIVE ISOTOPES BY THE DEVELOPING EGGS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. V. Kosheleva.
Trans from Trudy Polyar Nauch Issled 1971 p 7-15, 8 tab, 10 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, Nuclear reactors, Nuclear wastes, Radioactivity, Water pollution, Water pollution sources, Water pollution effects, *Radioisotopes, Data collection, Fish, *Radioactivity effects, *Embryonic growth stage, Distribution, Viability, Comparative productivity, Cesium, Strontium.
Identifiers: Cerium, Yttrium.

A study was made of the effect of radioisotopes and the products of nuclear fission for three radioactivity levels. Data were collected on the distribution of activity (in percentage of the total) in the egg membrane, in the fluid of perivitelline space, in the embryonal body and in the yolk. The dynamics of viability of embryos during the incu-

bation period was clarified. It was found that the hatching period for embryos developing in water with radioisotopes lasts a longer time. It was also found that the products of nuclear fission and Ce144 cause greater changes than Cs137 and Sr90 + Y90. (See also W74-02059) (Houser-ORNL)
W74-02060

DEVELOPMENT OF ATLANTIC SALMON EGGS UNDER CONDITIONS OF RADIOACTIVE CONTAMINATION OF WATER BY STRONTIUM-90 - YTTRIUM-90 AND CERIUM--144,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
I. P. Migalovskiy.
Trans from Trudy Polyar Nauch Issled 1971, p 16-30, 16 fig, 4 tab, 16 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Radioactivity, Water pollution, *Water pollution effects, *Radioisotopes, *Strontium, Embryonic growth stage, Larvae, Fish, Larvae growth stage, Viability, Comparative productivity.
Identifiers: *Yttrium, *Cerium.

A study was made of the effect of radioactive isotopes Sr90 + Y90 (5.10 to the minus 6th power curie/liter, 5.10 to the minus 8th power curie/liter, 5.10 to the minus 10th power curie/liter) and Ce144 (3.10 to the minus 6th power curie/liter, 3.10 to the minus 8th power curie/liter, 3.10 to the minus 9th power curie/liter) on the embryonal development of the Atlantic salmon (Salmo salar L.). The action of the isotopes is manifested in lengthening of the hatching period, appearance of deformed embryos and larvae, in an increased death of eggs and larvae; for Ce144 it begins with a radioactivity level 3.10 to the minus 9th power curie/liter and for Sr90 + Y90 it begins with 5.10 to the minus 10th power curie/liter. In addition, at all Ce144 radioactivity levels up to the stage of onset of gastrulation there is an increased development rate. The dependence of the types of deformities on the specific action of the used isotopes was established. (See also W74-02059) (Houser-ORNL)
W74-02061

SOME DATA ON THE DEPENDENCE OF DOSE EFFECT FOR EGGS OF ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Podymakhin.
Trans from Trudy Polyar Nauch Issled 1971 p 31-35, 2 fig, 10 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, Water pollution, *Radioactivity, *Radioisotopes, *Water pollution effects, Biology, Cytological studies, Embryonic growth stages, Larvae, Fish.
Identifiers: Dose, Dose effect, *Dose effect curve.

A study was made of the dependence of the observed radio-biological effects on dose magnitude. As indices of the radiobiological effect. The mortality of the embryos and larvae and the number of anomalous larvae were used. The constructed dose-effect curves show that the magnitude of the radiobiological effect of beta-radiation for the considered indices is determined by the properties of the radioisotope whose influence was investigated. (See also W74-02059) (Houser-ORNL)
W74-02062

DEVELOPMENT OF FISH EGGS AND THE EARLY PERIOD OF GAMETOGENESIS IN THE EMBRYOS AND LARVAE OF THE ATLANTIC SALMON UNDER CONDITIONS OF RADIOACTIVE CONTAMINATION OF WATER,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
I. P. Migalovskiy.
Trans from Trudy Polyar Nauch. Issled 1971 p36-52, 1 fig, 5 tab, 16 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Radioactivity, *Radioisotopes, Water pollution, *Water pollution effects, *Strontium, *Fish eggs, Embryonic growth stages, Larvae, Biology, Cytological studies, Variability, Control, Productivity.

Three activity levels of Sr90 + Y90 were used : 2.10 to the minus 5th power, 0.7.10 to the minus 6th power and 0.6.10 to the minus 7th power curie/liter. Stages in development of eggs of the Atlantic salmon prior to closing of the blastopore, formation of the 'tail kidney,' yolk-vitelline circulation and one-day larvae were examined. There was no difference between the control and experimental variants with respect to duration of individual development stages and the length of embryos and larvae. In addition, at the mentioned development times, the number of primary sex cells (PSC) in control and experimental variants were computed. There was a depression in the process of formation of PSC for the experimental variant with an activity of 2.10 to the minus 5th power curie/liter, whereas the number of PBC in the experimental variant with an activity of 0.7.10 to the minus 6th power curie/liter approaches their number in the control and in the variant with 0.6.10 to the minus 7th power curie/liter the number somewhat exceeds the control. (See also W74-02059) (Houser-ORNL)
W74-02063

HISTOGENESIS AND FUNCTIONING OF THE HYPOPHYSIS AND THYROID GLAND IN THE LARVAE OF ATLANTIC SALMON EXPOSED TO IONIZING RADIATION,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
S. A. Oganesyan.
Trans. from Trudy Polyar Nauch. Issled, 1971. p 53-65, 9 fig, 4 tab, 20 ref, AEC Translation 7418.

Descriptors: Water pollution, Water pollution sources, *Radioactivity, *Atlantic salmon, *Water pollution effect, Embryonic growth stages, Larvae, Cytological studies, *Fish physiology, Biocontrol, Pathology, Marine biology, Biological membranes.
Identifiers: *Radiation effects.

In the thyroid gland of larvae whose embryonal period transpired with chronic exposure to radiation, one can observe characteristic degenerative changes and impairments in release of the secretion. In the hypophysis one can detect growth of the parenchyma, consolidation of nuclei and an increased mitotic activity. Total irradiation in doses of 350 and 1000 R causes phase changes in the thyroid gland, expressed during the first stage in an intensification and later in a depression of secretory activity. (See also W74-02059) (Houser-ORNL)
W74-02064

EFFECT OF STRONTIUM-90 + YTTRIUM-90 ON THE DEVELOPMENT AND FUNCTIONING OF THE HATCHING GLANDS IN ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
S. V. Kasatkina.
Trans from Trudy Polyar Nauch Issled, 1971. p 66-74, 4 fig, 1 tab, 27 ref, AEC Translation 7418.

Descriptors: *Strontium, Water pollution, Water pollution sources, *Radioactivity, *Atlantic salmon, *Water pollution effects, Hatching, *Fish eggs, Embryonic growth stage, Cytological studies, Animal physiology, Variability, Enzymes, Mortality.
Identifiers: *Radiation effects, *Yttrium.

A study was made of the morphophysiological state of the hatching glands in embryos developing under conditions of chronic contamination of water by Sr90 + Y90 (2.10 to the minus 5th power, 0.7.10 to the minus 6th power, 0.6.10 to the minus 7th power curie/liter) and also with a combined exposure Sr90 + Y90 2.10 to the minus 5th power curie/liter + 350 R. No changes in morphology of the hatching glands were discovered in a study of histologic specimens of the head part of experimental embryos. In all the experimental variants the action of the radioisotopes Sr90 + Y90 causes a more intensive enzyme accumulation by the hatching glands, whereas in variants with an activity of 2.10 to the minus 5th power, 0.7.10 to the minus 6th power and 0.6.10 to the minus 7th power curie/liter it leads to earlier onset of hatching in comparison with the control. With a combined exposure of the Atlantic salmon embryo the process of enzyme secretion by the hatching glands is slowed down; this can probably be attributed to the aftereffect of X-irradiation. (See also W74-02059) (Houser-ORNL)
W74-02065

CHANGE IN PERIPHERAL BLOOD IN THE EMBRYOS AND LARVAE OF ATLANTIC SALMON UNDER THE INFLUENCE OF RADIOACTIVE CONTAMINATION OF THE WATER AND X-RAYS,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. V. Kosheleva.
Trans from Trudy Polyar Nauch. Issled, 1971. p 75-88, 1 fig, 4 tab, 17 ref, AEC Translation 7418.

Descriptors: Water pollution, Water pollution sources, Radioactivity, *Strontium, Fish, Mortality, *Atlantic salmon, Electromagnetic waves, *Water pollution effects, Cytological studies, Fish physiology.
Identifiers: *Yttrium, *Red blood, *Radiation effects.

A study was made of the effect of chronic exposure to Sr90 + Y90 of different concentrations on the morphological composition of the red blood of Atlantic salmon embryos and larvae. In the egg blastula stage in the aquarium with Sr90 + Y90 with an activity of 2.20 to the minus 5th power curie/liter there was additional irradiation by X-rays in a dose of 350 R. It was established that a characteristic manifestation of the action of Sr90 + Y90 is a considerable depression in the rate of maturing of formed blood elements and the appearance of cells with different morphological changes. The degree of the radiation effect increases with an increase in the radioactive isotope in the water. With a combined exposure there was no additional changes with respect to the variant with Sr90 + Y90 (2.10 to the minus 5th power curie/liter). (See also W74-02059) (Houser-ORNL)
W74-02066

CHRONIC EFFECT OF STRONTIUM-90 + YTTRIUM-90 ON THE FREQUENCY OF CHROMOSOMAL ABERRATIONS IN THE EMBRYONAL CELLS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Migalovskaya.
Trans from Trudy Polyar Nauch. Issled, 1971. p 89-99, 1 fig, 6 tab, 13 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Embryonic growth stage, Larvae, *Radioactivity, Water pollution, *Water pollution effects, *Strontium, Water pollution sources, Cytological studies, Fish, Animal physiology, Chromosomes, Variability.
Identifiers: *Radiation effects, *Yttrium.

Three radioactivity levels for Sr90 + Y90 were used : 2.10 to the minus 5th power curie/liter, 0.7.10 to the minus 6th power curie/liter and 0.6.10 to the minus 7th power curie/liter. Developing embryos of the Atlantic salmon were investigated in the stages of the blastometric and epithelial blastula, gastrula, and also at the age of one-day larvae. The criteria for the radiation effect were the mitotic index and the frequency of chromosomal aberrations. Temporary specimens stained with acetocaraine were investigated. No decrease in the percentage of dividing cells was detected in the investigated development stages. In variants with a radioactivity level of 2.10 to the minus 5th power curie/liter and in a combined exposure there was a reliable increase in the frequency of chromosomal aberrations, beginning with the epithelial blastula stage. A great diversity of types of chromosomal aberrations was noted: individual bridges, fragments, multiple bridges, presence in the cell of several fragments, multipolar mitoses, and formation of micronuclei. (See also W74-02059) (Houser-ORNL)
W74-02067

EFFECT OF X-IRRADIATION ON THE GAMETES AND EMBRYONAL CELLS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Migalovskaya.
Trans. from Trudy Polyar Nauch. Issled, 1971. p 100-112, 2 fig, 8 tab, 12 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Embryonic growth stages, *Chromosomes, Fish eggs, Cytological studies, *X-rays, Animal physiology, Metabolism, Marine fish.
Identifiers: *Radiation effects, Fertilization, Sperm, Radiation damage.

A study was made of the influence of small radiation doses (50, 150, and 350 R) on the fertilizing capacity of spermia and on the frequency of chromosomal aberrations in the cells of Atlantic salmon embryos in the blastula and gastrula stages. These radiation doses did not cause an appreciable decrease in the fertilizing capacity of the spermia. The percentage of fertilization in the control and in all experimental variants was at the same level. The criterion for radiation damage to the nucleus was the frequency of the late anaphases with bridges and fragments. Statistically reliable differences were obtained for the frequency of chromosomal aberrations in all the studied stages of development between the control and the 350-R variant. Radiation damage to the nuclear apparatus persisted at approximately the same level during embryogenesis of the Atlantic salmon. No decrease in mitotic activity was noted during the studied development stages. With irradiation of the dividing egg in the blastula stage in a dose of 350 R there was a temporary lag in mitotic divisions and also an increase in the frequency of chromosomal aberrations. The chromosomal aberrations were represented for the most part by individual bridges and fragments. Multiple bridges and multipolar mitoses were encountered in individual cells. (See also W74-02059) (Houser-ORNL)
W74-02068

RADIOMETRIC AND DOSIMETRIC CHARACTERISTICS OF EXPERIMENTS FOR DETERMINING THE INFLUENCE OF RADIOACTIVITY OF A WATER MEDIUM ON THE DEVELOPMENT OF EGGS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Podymakhin.
Trans. from Trudy Polyar. Nauch. Issled., 1971. p 113-133, 5 fig, 8 tab, 12 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Water pollution, *Radioactivity, *Radioactivity effects, *Water pollution effects, *Fish eggs, Cytological studies, Embryonic growth stages, Marine fish, Strontium.
Identifiers: Eggs, Yttrium.

A detailed study was made of the methodological characteristics and specific results of measurements of the radioactivity of the eggs (and their individual components) of the Atlantic salmon. The material was obtained in an experiment with the incubation of eggs in aquaria with water contamination by Sr90 + Y90, Co144 + Pr144 and Cs137 at the Ura-Guba Fish Hatchery during the period from October 1966 through June 1967. On the basis of radiometric data, the absolute values of some characteristics of the natural dose fields and radiation loads on eggs in aquaria with radioactive contamination of the water were determined. These load values determine the degree of the radiobiological effect of the isotopes in the water on the fish eggs. (See also W74-02059) (Houser-ORNL)
W74-02069

POLYCHLORINATED BIPHENYL RESIDUES IN HUMAN PLASMA EXPOSE A MAJOR URBAN POLLUTION PROBLEM,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 05B.
W74-02078

EFFECT OF WATER DEPTH ON THE INFECTION OF BIOMPHALARIA GLABRATA BY MIRACIDIA OF ST. LUCIAN SCHISTOSOMA MANSONI UNDER LABORATORY AND FIELD CONDITIONS,
E. S. Upatham.
J Helminthol. Vol 46, No 4, p 317-325. 1972. Illus.
Identifiers: *Biomphalaria-Glabrata, *Miracidia, *Schistosoma-Mansoni, St-Lucian, Water depth, *West Indies.

Laboratory and field trials were carried out to investigate the influence of depth on the infection of B. glabrata by St. Lucian S. mansoni miracidia. In both laboratory and field experiments, miracidia located and infected snails to a depth of 122 cm. The degree of infection seems to be related to the size of a habitat and its water volume. Infection rates were high at the miracidial point of entry where miracidium-snail interaction was maximum and at the water surface where miracidia eventually congregated. In none of the experiments was there evidence that biological buffering affected the snail infection rates. Miracidia were more efficient in locating and infecting snails when they were released into the bottom than onto the top of a habitat. In natural St. Lucian habitats, West Indies, depths rarely exceed 61 cm, and so any snails present will be exposed to infection irrespective of where they are in a habitat or the depth at which the S. mansoni eggs hatch.--Copyright 1973, Biological Abstracts, Inc.
W74-02097

EFFECTS OF SOME PHYSICO-CHEMICAL FACTORS ON THE INFECTION OF BIOMPHALARIA GLABRATA (SAY) BY MIRACIDIA OF SCHISTOSOMA MANSONI SAMBON IN ST. LUCIA, WEST INDIES,
E. S. Upatham.
J Helminthol. Vol 46, No 4, p 307-315. 1972. Illus.
Identifiers: Biomphalaria-Glabrata, Infection, *Miracidia, Physicochemical studies, *Schistosoma-Mansoni, *West Indies (St. Lucia).

Four physico-chemical charac teristics of water volume, salinity, pH and turbidity were each found to affect infection of B. glabrata by S. mansoni miracidia. The rate of infection decreased as the water volume increased, from 90.6%-0.005 l to 47.5% at 50 l. The rate of infection decreased as NaCl concentration increased, from 78.7% at 0.5 ppm to 2.1% at 4200 ppm. Above 4200 ppm no infection occurred. The activity of the miracidia was affected above 1200 ppm. The snails become nonmotile at above 4800 ppm and died within 16 hr at higher concentrations. The infection rate was zero at pH 4, very low at pH 5 and 10, and highest at pH 7-9, with a peak at pH 8. Snails tolerated all pH levels tested. Miracidia were active for 1-2 min at pH 4, 5-10 min at pH 3, 3 hr at pH 6, 5-6 hr at pH 7-9, and 2 hr at pH 10. The rate of infection decreased sharply as turbidity increased from zero ppm-100 ppm, but then decreased slowly from 100 ppm-500 ppm. No adverse effect of turbidity on snails was detected within 1 hr. Although the physico-chemical characteristics of natural St. Lucian waters do not prevent the infection of B. glabrata by S. mansoni miracidia, naturally occurring values of certain factors may reduce the chance of snails becoming infected.--Copyright 1973, Biological Abstracts, Inc.
W74-02098

EXPOSURE OF CAGED BIOMPHALARIA GLABRATA (SAY) TO INVESTIGATE DISPERSION OF MIRACIDIA OF SCHISTOSOMA MANSONI SAMBON IN OUTDOOR HABITATS IN ST. LUCIA,
E. S. Upatham.
J Helminthol. Vol 46, No 4, p 207-306. 1972. Illus.
Identifiers: *Biomphalaria-Glabrata, Dispersion, Exposure, Habitats, *Miracidia, *Schistosoma-Mansoni, *West Indies (St. Lucia).

Laboratory studies showed 2 types of cages to be suitable for exposing unifected B. glabrata in field habitats as a means of locating S. mansoni miracidial infestations. Tests conducted in tanks under simulated field conditions showed that miracidia moved away from the point of inoculation in non-random fashion and congregated at the margins of the tanks. In a natural habitat, miracidia located and infected caged snails at distances of 33 cm vertically and 106.7 cm horizontally. The pattern of infection was similar in the simulated field and field experiments, but field infection rates were lower. For transmission studies in field habitats, caged laboratory-bred snails should be placed at the margin of the habitat to ensure the maximum snail-miracidium interaction.--Copyright 1973, Biological Abstracts, Inc.
W74-02099

AGE, GROWTH AND MORTALITY OF THE WHITE PERCH, MORONE AMERICANA, IN THE JAMES AND YORK RIVERS, VIRGINIA,
Virginia Inst. of Marine Science, Gloucester Point.
R. A. St. Pierre, and J. David.
Chesapeake Sci. Vol 13, No 4, p 272-281. 1972. Illus.
Identifiers: Age, Growth, Morone-Americana, *Mortality, Rivers, *Virginia, *White perch.

More than 800 white perch, M. americana, were collected from each of 2 major tributaries of southern Chesapeake Bay to compare age structures, growth and mortaility rates. The James River is characterized by heavy domestic and industrial pollution in several tributaries and segments, whereas the York River is only slighlty polluted. Maximum ages determined by scale analysis were 7 and 10 yr for males and females in both rivers. Yearling perch in the York River appeared to have a significantly greater mean length than those from the James but this difference is largely due to sampling bias. Both sexes of white perch from the James River were significantly larger than perch from the York River at ages II and III. However, mean lengths of white perch from age groups IV and older were not significantly different between rivers for either sex. In both rivers females were significantly longer (to age V) and heavier (all ages) than males of comparable age. Yearly growth increments were greatest early in life. All yr calsses of white perch followed a similar growth pattern during their first yr in both

estuaries. However, for later yr of life earlier yr classes apparently had a greater mean length than those from more recent yr at comparable ages. Males were more abundant than females for the first 3 yr of life in both rivers, however, females were present in significantly greater numbers in all older age groups. Analysis of relative age frequency suggested dominant yr classes in 1964 and 1965 in the James River, and weak yr class in 1968. No dominant yr classes were apparent from the York River collections. Mortality rates were calculated from age frequency distributions. Total annual mortaility in the James River was about 69% for males after age IV and for females after age VI. In the York River, males at age III and older die at a rate of 59%, whereas females older than age V have an annual mortality of 57%.--Copyright 1973, Biological Abstracts, Inc.
W74-02101

EFFECT OF NITRILOTRIACETIC ACID ON GROWTH AND MATING IN STRAINS OF ESCHERICHIA COLI K-12,
G. J. Stine, and A. A. Hardigree.
Can J Microbiol. Vol 18, No 7, p 1159-1162. 1972.
Identifiers: Coli K-12, Growth, Mating, *Nitrilo triacetic acid, Strains.

The effect of nitrilotriacetic acid (NTA), a possible substitute for phosphates in detergents (and possible environmental pollutant) was studied on strains of E. coli K-12. No nutagenic effect was observed, but inhibition of growth and recombinant formation with increasing concentrations of NTA occurred. NTA also induced abnormal cell morphology and yellow pigmentation in colonies.--Copyright 1973, Biological Abstracts, Inc.
W74-02102

DETERMINATION OF VITAMIN B12, THIAMINE AND BIOTIN IN LAKE TAHOE WATERS USING MODIFIED MARINE BIOASSAY TECHNIQUES,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
A. F. Carlucci, and P. M. Bowes.
Limnol Oceanogr, Vol 17, No 5, p 774-776, 1972.
Identifiers: Amphidinium-carterae, *Biotin, California, Cyclotella-nana, Lakes, Monochrysis-lutheri, Nevada, *Thiamine, *Vitamin B-12, *Lake Tahoe, *Algae bioassay.

Seawater bioassays for dissolved vitamin B12, thiamine and biotin were modified for freshwater samples. The assay algae are: B12, Cyclotella nana; thiamine, Monochrysis lutheri; and biotin, Amphidinium carterae. The lowest detectable levels of dissolved vitamins are: B12, 0.1 ng/l; thiamine, 4 ng/l; and biotin, 0.4 ng/l. Summer and winter samples in a water column near the center of Lake Tahoe, California, were assayed using this method, and, with one exception, vitamins were found only in the euphotic zone.--Copyright 1973, Biological Abstracts, Inc.
W74-02118

PHOSPHORUS AND ALGAL GROWTH IN THE SPOKANE RIVER,
Washington State Univ., Pullman. Dept. of Sanitary Engineering.
R. J. Condit.
Northwest Sci. Vol 46, No 3, p 177-189. 1972. Illus.
Identifiers: *Algal, Growth, *Bioassay, Blooms, Growth, Nitrogen, *Phosphorus, Productivity, Rivers, Runoff, Selenastrum-Capricornutum, Water pollution effects, *Washington (Spokane River), *Chlorophyta.

The green algal form, Selenastrum capricornutum, proved to be an adequate and responsive test organism for natural water bioassays when properly acclimated. The growth parameters obtained from control flasks indicate that during the test periods, the total productivity and algal growth rates in the natural waters increase as the river progresses through the city. During the spring, high runoff provided adequate nutrients to promote algal growth in bloom proportions. The large biomass reduced P concentrations to limiting levels in the river. The especially high algal production in the lower river was due in part to the added P made by the wastewater treatment plant above the Bowl and Pitcher Bridge. Dissolved orthophosphate levels at this station were sufficiently high to cause inhibition to algal growth rates when additional P was introduced in the bioassay. The Aug. bioassay indicated that productivity was governed by factors other than limiting concentrations of P. Nitrogen was found to be limiting in Porcupine Bay, while Mg appeared to be a limiting factor in Sullivan Road waters.--Copyright 1973, Biological Abstracts, Inc.
W74-02143

5D. Waste Treatment Processes

WATER POLLUTION BY DAIRY FARM WASTES AS RELATED TO METHOD OF WASTE DISPOSAL,
Auburn Univ., Ala. Dept. of Animal and Dairy Science.
For primary bibliographic entry see Field 05B.
W74-01651

ENVIRONMENTAL DISTRIBUTION AND METABOLIC FATE OF KEY INDUSTRIAL POLLUTANTS AND PESTICIDES IN A MODEL ECOSYSTEM,
Illinois Univ., Urbana. Dept. of Entomology.
R. L. Metcalf, P-Y Lu, and I. P. Kapoor.
Available from National Technical Information Service as PB-225 479/5 in paper copy; $1.45 in microfiche. Illinois Water Resources Center Research Report No 69, June 1973, 80p, 15 fig, 28 tab, 37 ref, append. OWRR B-050-ILL (1), 14-31-0001-3273.

Descriptors: Ecosystems, *Industrial wastes, Model studies, *Food chains, Solubility, Toxicity, *Pesticides.
Identifiers: *Radiolabeled contaminants, Food chain organisms, *Biodegradability index, Plasticizers, Partition coefficient, Screening pollutants, *Ecological magnification.

The contamination of water supplies with toxic substances liberated into the environment either accidentally as industrial or household wastes or purposefully as pesticides and food additives is an important problem in environmental quality. Radiolabeled contaminants used in a laboratory model ecosystem provide an elegant method for determining the degradative fate of potential pollutants, indications of their toxic effects to a variety of food chain organisms, and measurement of their ecological magnification in food chain organisms. More than 30 important organic chemicals including raw materials, plasticizers, heat exchange fluids, insecticides, and herbicides have been evaluated as radiotracers in such a model ecosystem with a seven element food chain. The results have been expressed in terms of ecological magnification and biodegradability index, and have been examined for correlation with such physio-chemical properties as water solubility, and partion coefficient, and for relationships to electron distribution. The model ecosystem technology provides a simple and informative screening technique for detecting potential environmental pollutants and for selecting approximately biodegradable molecules for industrial development.
W74-01655

METHODOLOGIES FOR FLOW PREDICTION IN URBAN STORM DRAINAGE SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
B. C. Yen.
Available from the National Technical Information Service as PB-225 480/3, $4.75 in paper copy, $1.45 in microfiche. Illinois Water Resources Center Research Report No. 72, 1973. 150 p, 41 fig, 8 tab, 92 ref, 11 append. OWRR B-043-ILL (8), 14-31-001-3078.

Descriptors: Drainage, *Drainage systems, Effluents, Waste water (Pollution), Flood routing, Flow characteristics, Hydraulics, *Hydraulic design, Hydrographs, *Mathematical models, *Open-channel flow, Overland flow, *Risks, Runoff, Safety factors, *Storm water, *Unsteady flow, *Urban runoff, Equations, Sewers, Simulation analysis.
Identifiers: St. Venant equations.

An urban storm drainage system can be considered as an integrated system of components of urban surface, gutters, inlets, sewers branches, junctions, manholes, and other facilities. In this study the flow equations that can be used to solve storm drainage problems are critically reviewed and the mathematical methods for solving the St. Venant equations are compared. A method for routing the unsteady flow due to rainfall and other inputs through land surface and gutter to produce the inlet hydrograph is proposed. The results have been presented in non-dimensional form for general use. A mathematical simulation model for tree-type sewer networks is developed for flow prediction and design by using the St. Venant equations to route the inlet hydrographs through the network. An overlapping segment scheme is used to account for the backwater effects and mutual influences of the unsteady flow in the sewers. Furthermore, new approaches based on risk consideration are proposed for determination of design rainfall and for design of sewers and other hydraulic structures.
W74-01656

SEPTIC SYSTEMS: EFFECTS OF SURFACE AND SUBSURFACE WATER,
Lake County Health Dept., Waukegan, Ill.
For primary bibliographic entry see Field 05B.
W74-01716

A LITERATURE REVIEW ON THE BIOLOGICAL PURIFICATION METHODS OF SEWAGE IN CHEMICAL-PHARMACEUTICAL PLANTS, (IN RUSSIAN),
Moskovskii Inzhenerno-Stroitelnyi Institut (USSR).
T. A. Karyukhina, S. A. Klein, G. A. Shangina, L. V. Yangolenko, and L. Z. Krzhapol'skaya.
Khim-Farm Zh. Vol 5, No 11, p 30-35, 1971.
Identifiers: *Biological treatment, *Literature review, Methods, Pharmaceutical plants, Reviews, *Sewage treatment, Water purification, *Waste water treatment.

The following points were stressed: it is essential to neutralize the sewage; sewage should be exposed to biologic oxidation in aerobic, as well as anaerobic conditions; the multistep purification seems promising in combinations, air tank-biofilter, and biofilter-biofilter; and sewage purification in most cases has been insufficient according to sanitary requirements. Extensive experimental studies are recommended, since technical literature has shown that this problem can be solved satisfactorily.--Copyright 1973, Biological Abstracts, Inc.
W74-01756

BOISE METROPOLITAN AREA SANITARY SEWAGE COLLECTION AND TREATMENT FACILITIES: PHASE II REPORT.
J-U-B Engineers, Inc., Boise, Idaho; and Barton, Stoddard, Milhollin and Higgins, Boise, Idaho.

Prepared for ADA Council of Governments, Boise, Idaho. ACOG Environmental Planning Report 1. March 1, 1973. 138 p, 18 fig, 1 append.

Descriptors: *Sewage treatment, *Sewers, *Idaho, Sewerage, Septic tanks, Biochemical oxygen demand. Costs, *Treatment facilities, Waste water treatment.
Identifiers: *Sewage collection, *Boise (Idaho).

Boise, Idaho has a present population of 97,000 and will grow to 165,000 by 2000. Rapid growth has produced a proliferation of septic tanks, which may eventually produce health hazards. Other problems are overloading of sewer lines due to groundwater infiltration and need for additional treatment as a result of lower summer flows on the Boise River and a maximum daily loading standard of 2000 pounds set by the State Department of Environmental Protection and Health. Secondary treatment will be adequate to meet the new standards. Originally, two sewerage plans were presented in November, 1972, but the ADA Council of Governments adopted a compromise known as the 'General Plan' presented herein. First priority for construction is urged for upgrading the existing five treatment plants and extending mains into the immediately adjacent areas. Second priority should be given to trunk line capacity, mains, and additional treatment capacity for specified neighborhoods. A new downstream treatment facility will be built on Eagle Island in the Boise River. Two existing treatment plans will be phased out. Recommendations are made for possible pretreatment of industrial wastes before discharge into the public waste collection system. It is recommended that the possibility of future tertiary treatment by spray irrigation should be investigated. The plan advanced by this study is judged to be adequate for twenty years. Attention is given to costs and financing. (Stein-North Carolina)
W74-01854

SEWAGE FARMING,
Washington Univ., St. Louis, Mo., Center for the Biology of Natural Systems.
J. Allen.
Environment. Vol 15, No 3, p 36-41, April, 1973. 2 fig, 1 tab.

Descriptors: *Sewage treatment, *Filtration, *Experimental farms, *Irrigation, *Fertilization, Waste water treatment, *Water reuse, Phosphorus, Nitrate, Saline deposits, Heavy metals.
Identifiers: *Sewage farming, Soil saturation, Salinization, Chicago.

Fertilization of crops with sewage was a nineteenth century European practice which purified the sewage as it filtered through soil. Sewage farming is investigated here for its contemporary American potential. The most comprehensive American experiment in sewage farming has been conducted at Pennsylvania State University. Initial observations showed that as wastewater trickled through the first 12 inches of soil, nitrate concentrations in the water were reduced 68 to 82%, phosphate concentrations were reduced 99%, and organic nitrogen was reduced 68 to 82%. No coliform bacteria were found after three feet of percolation. Plots irrigated with sewage produced greater yields than control plots fertilized conventionally, and equal yields with plots fertilized and irrigated by conventional means. Irrigation by sewage can only work in soils permeabile enough to absorb effluent and natural precipitation without becoming saturated and depleted of oxygen. Timing of sewage applications effects degree of saturation. Salts and heavy metals (especially copper, zinc, and boron) may accumulate in sewage-irrigated soils, but periodic freshwater flushing or control of discharges into sewers might alleviate these problems. Dangers of crop contamination are discussed. The Israeli Ministry of Health indentifies crops which may be safely grown with primarily treated sewage. Cost estimates by the Corps of Engineers in 1972 show land treatment of sewage on Indiana farmland to be the least expensive means of wastewater treatment for the Chicago area. Long-term effects of sewage irrigation on soil are undetermined. (Stein-North Carolina)
W74-01863

WATER RESOURCE PRESERVATION BY PLANNED RECYCLING OF TREATED WASTEWATER,
Culp, Wesner, Culp-Clean Water Consultants, Corona Del Mar, Calif.
G. L. Culp, R. L. Culp, and C. L. Hamann.
Journal of the American Water Works Association, Vol 65, No 10, p 641-647, October, 1973. 3 fig, 5 tab.

Descriptors: *Tertiary treatment, *Water reuse, *Waste water treatment, *Potomac River, Low flow, *Recycling, Viruses, Heavy metals, Nutrients, Water supplies, Maryland, Virginia, District of Columbia.
Identifiers: Trace organics, Urban water supplies, Washington metropolitan area.

Controlled indirect reuse of water has been proposed in the Washington, D.C. metropolitan area to solve an impending water shortage. Advanced wastewater treatment facilities are being considered for most of Montgomery County, which draws its water supply from and discharges its treated wastewater into the Potomac River. The Virginia State Water Control Board has also recommended a regional sewage collection system and advanced wastewater treatment plant for the Occoquan watershed in Fairfax and Prince William Counties. Water demands in both Montgomery County and the Occoquan watershed exceed available safe yields from water supplies at low flow periods. Export of treated wastewater is therefore viewed as a waste of a resource. Treatment processes for advanced wastewater treatment plants in the two areas are graphically illustrated. Controlled indirect reuse of wastewater differs from uncontrolled indirect reuse in that the latter is the traditional practice of discharging secondarily-treated wastes into surface waters and treating the surface water for consuption downstream, while the former anticipates reuse and thoroughly treats waste before discharge. Controlled direct reuse differs from controlled indirect reuse in that with direct reuse, water is recycled for consuption without first being discharged into surface waters. Removal of viruses, heavy metals, trace organics, and nutrients by advanced wastewater treatment is discussed. (Stein-North Crolina)
W74-01866

NORTH LOOKS AT WASTE WATER CLEANUP NEEDS.

Environmental Science and Technology, Vol 7, No 11, p 998-999, November, 1973. 2 fig.

Descriptors: *Sewage treatment, *Cold regions, Cold weather construction, *Permafrost, *Arctic, *Subarctic, Aeration, Chlorine, Lime, Hydrogen ion concentration, Alaska, Canada, *Waste water treatment, Waste treatment.
Identifiers: Psychrophilic bacteria, Aqua Nuchar A-powered carbon, Granular carbon, Vacuum sewage collection.

Sub-Arctic and Arctic regions have particular waste treatment problems due to the extremely cold climate. These problems require unique technology for solution. Freezing of wastes by permafrost can retain disease-producing organisms for a long time. Few biological filters exist in very cold climates. Consequently, chemical treatment is substituted. Aeration treatment of wastes has been successfully used in the Soviet Union, Manitoba, and Alaska. Tests in Brandon, Manitoba showed that aeration over a 24-hour period reduced coliform to acceptable levels. The Army Cold Region Research Evaluation Laboratory has developed a single tank extended aeration secondary treatment system which is applicable to permafrost regions at lower costs than other systems. Industrial wastes from a sulfite pulp and paper factory have successfully been combined with municipal wastes and treated, so long as proper BOD-nutrient ratios were maintained. Interest in psychrophilic, or cold temperature bacteria has grown; experiments show that the percentage of psychrophiles in sludge samples increases dramatically as temperature decreases. Research on nonbiological treatment methods involving Aqua Nuchar A-powered carbon and granular carbon is reported. Studies of effects of the addition of lime to sludge have proven temperature a less significant factor for disinfection than pH. Chlorine appears less effective for disinfection at low temperatures than at moderate temperatures. An experimental vacuum sewage collection system has proven relatively inexpensive where gravity sewers are difficult to construct. Such a system would drastically reduce the amount of wastewater needing treatment. (Stein-North Crolina)
W74-01868

COALESCING PLATES AND PACKS FOR OIL WATER SEPARATION IN VARIOUS SHIPBOARD APPLICATIONS,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 05G.
W74-01882

THE REMOVAL OF TOXIC METALS FROM WATER BY REVERSE OSMOSIS,
Research Triangle Inst., Durham, N.C.
F. O. Mixon.
Available from the National Technical Information Service as PB-223 449, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 889, September 1973. 43 p, 1 fig, 37 tab. OSW Contract 14-30-3064.

Descriptors: *Membrane processes, *Reverse osmosis, *Pilot plants, *Desalination, Desalination processes, Water treatment, Metals, Toxicity, Sewage Effluents, *Brackish water, *Metals, Cadmium, Barium, Lead, Chromium, Copper, Zinc.
Identifiers: Cellulose acetate membranes, Polyamide membranes.

Experimental bench scale studies were carried out with cellulose acetate and polyamide reverse osmosis membranes to establish rejection efficiencies for different metallic contaminants including barium, cadmium, zinc, copper, chromium and lead. These tests were conducted with trace levels of these metallic contaminants, singly and in combination and at different concentrations, while desalting potable water, various wastewaters and brackish waters. Except for copper in wastewater, metallic removal efficiencies of about 90% or greater were experienced. It was concluded that reverse osmosis may be effectively applied in the production of potable water where the raw water contains trace amounts of the various metals considered in this study. Reverse osmosis may also prove useful where sewage treatment plant effluent has residual trace metal content. (OSW)
W74-01906

TESTING REVERSE OSMOSIS MODULES FOR WASHWATER RECYCLING,
Abcor, Inc. Cambridge, Mass.
R. L. Goldsmith, S. Hossain, and M. Tan.
Available from the National Technical Information Service as PB-223 195 $8.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 877, June 1973. 111 p, 17 tab, 12 fig, 5 ref. OSW Contract 14-30-3158.

Descriptors: *Reverse osmosis, *Membrane Processes, Membranes, *Semipermeable membranes, *Water treatment, Permselective Membranes, Filtration, Permeability, Separation techniques, Water Purification, Water quality, *Recycling, Desalination.
Identifiers: *Washwater purification, Polybenzimidazole hollow fibers, Cellulose acetate blend, Sulfonated polyphenylene oxide, Salt rejection, Membraneflux, Membrane testing, Reverse osmosis test loop.

Three membrane modules were evaluated for concentration of washwater at 165F. The objective was to provide data upon which OSW could base a recommendation for further development of membranes for use in spacecraft missions. The membranes testes were: polybenzimidazole (PBI) (hollow fiber configuration); cellulose acetate (CA) blend (spiral wound confiruration); and sulfonated polyphenylene oxide (PPO) (plate-and-frame configuration). Tests were conducted both with a synthetic washwater which contained ABS, urea, lactic acid, and sodium chloride, and with simulated (real) washwater. The results are summarized in tabular form. (OSW)
W74-01924

INTERACTION OF FEEDWATER COLLOIDS WITH THE SURFACE OF REVERSE OSMOSIS MEMBRANES,
Gulf Environmental Systems Co., San Diego, Calif.
E. E. Bevege, J. E. Cruver, J. G. Kilbride, S. S. Kremen, and A. B. Riedinger.
Available from NTIS as PB-223 193 $8.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 883, July 1973. 111 p, 42 fig, 40 tab, 37 ref. OSW Contract 14-30-1086.

Descriptors: *Reverse osmosis, *Colloids, Humic acids, Permeability, *Filtration, Membranes, Membrane processes, Separation techniques, Sewage treatment, *Waste water treatment, Clays.
Identifiers: Feedwater colloids, Ultrafiltration, Feedwater-surface interactions, Membrane permeability decline, Membrane fouling, Streaming current, Sequestering agents.

The fouling of reverse osmosis modules was studied under very carefully controlled conditions. A pilot reverse osmosis unit was run 'open loop,' and the modules were placed in parallel. Surface waters were simulated by mixing various combinations of humic acid, salts, and clay. Membrane of three different permeabilities was used. Pressure adjustment gave constant permeate flow. The measurement of apparent streaming current provided data on neutralization of charge and consequently on coagulation as distinct from precipitation. It was thus a measure of colloidal stability. Eight runs were made in the unit, based on the laboratory findings and using different feeds. This led to the postulation of two different fouling mechanisms. The first of these is the effect of acidity and cation concentration on stability of humic acid solutions as the pH was lowered and cation concentration, especially Polyvalent cation concentration, increased. A second mechanism was the interaction between humic acid and clay. Two different methods for prevention of fouling were studied: sequestration of cations and coagulation of organics followed by filtration. (OSW)
W74-01925

A METHODOLOGY FOR DETERMINING OPTIMAL LONGITUDINAL SPACING OF EFFLUENT DISCHARGES INTO A RIVER,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
For primary bibliographic entry see Field 05B.
W74-01928

MULTI-TIME PERIOD FACILITIES LOCATION PROBLEMS: A HEURISTIC ALGORITHM WITH APPLICATION TO WASTE WATER TREATMENT SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
H. S. Bhalla, and R. F. Rikkers.
Available from the National Technical Information Service as PB-225 697 $7.00 in paper copy, $1.45 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication No 21, 1971. 87 p, 6 fig, 5 tab, 23 ref. OWRR B-011-MASS (8).

Descriptors: *Waste water treatment, *Mathematical models, *Linear programming, *Cost analysis, Transportation, Construction, *Treatment facilities, Sites.
Identifiers: *Algorithms.

A multi-time period, facilities location problem with fixed charges on the facilities and the supply routes and variable facility operating cost and transportation cost is studied. The problem originally arose in the contest of regional waste water treatment systems. A heuristic approach is taken to arrive at a 'good' solution without an exhorbitant expenditure of computer time. The problem is separated into two parts. Expansion of a facility is not allowed in the first part. This constraint is removed in the second part and an optimal building strategy, using existing algorithms, may be obtained independently for each facility built in the first part. A heuristic algorithm, having three phases, is developed for the problem of the first part. A most central facility location, relative to the unallocated demand center is defined in the first phase. The solution obtained is checked for any possible advantage to be gained by dropping some of the facility locations in the solution and reassigning the demand points allocated to them to the remaining locations in the solution. In the second phase, depending upon allocations in the first phase, the demand centers are divided into two groups, fixed and free. An attempt is made to profitably assign the free demand centers to some of the facility locations not in the solution. This phase is terminated when no such assignment can be made. The solution obtained at the end of this phase is the final solution set. In the third phase, an attempt is made to delay the initial building time of facilities at some locations so as to realize a less expensive solution.
W74-01929

THE WRIGHTSVILLE BEACH, NORTH CAROLINA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS PLANTS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 03A.
W74-01931

THE CHULA VISTA, CALIFORNIA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 03A.
W74-01932

USE AND CONSERVATION OF WATER RESOURCES IN THE UKRAINE (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV V UKRAINSKOY SSR),
N. A. Garkusha.
Vodnyye Resursy, No 3, p 13-17, 1972.

Descriptors: *Water resources, *Water utilization, *Water conservation, Water supply, Water pollution, *Water pollution control, Water quality control, Water management (Applied), Irrigation practices, Irrigation systems, Return flow, *Water reuse.
Identifiers: *USSR (Ukraine).

The Central Committee of the Communist Party of the Ukraine and the Council of Ministers of the Ukrainian SSR have recently adopted a number of resolutions aimed at rational use of water in the Republic and at radical improvement in its protection from contamination and depletion. Per capita water resources in the Ukraine are 1,100 cu m a year or 15 times less than those for the USSR as a whole. Only three Union Republics have less adequate water supplies--Turkmenistan, Moldavia, and Uzbekistan. Water shortage problems occur in the Donets Basin, Krivoy Rog region, the Crimea, and in the Chernovtsy and other oblasts, and virtually all water resources of the Severskiy Donets, Dniester, and Southern Bug Rivers are fully utilized. Reference is made to operation of the 23,300-hectare Bortnichskaya irrigation system in Kiev as the largest and most efficient system of wastewater irrigation in the Ukraine, and present and future problems of water supplyin the Republic are discussed. (Josefson-USGS)
W74-01971

SUBSURFACE QUALITY TRANSFORMATIONS DURING THE INITIATION OF A NEW STABILIZATION LAGOON,
Arizona Univ., Tucson. Water Resources Research Center.
L. G. Wilson, W. L. Clark, III, and G. G. Small.
Water Resources Bulletin, American Water Resources Association, Vol 9, No 2, p 243-257, April 1973. 3 fig, 3 tab, 15 ref. OWRR A-025-ARIZ (5). 14-31-0001-3503.

Descriptors: *Oxidation lagoons, Seepage, Deep percolation, Nitrification, Denitrification, Path of pollutants, Leaching, Nitrates, E. Coli, Chemical oxygen demand, Groundwater recharge, *Waste water treatment, *Arizona.
Identifiers: Tucson (Ariz).

Raw sewage was metered into a newly-constructed lagoon of the Pima County Department of Sanitation, Tucson, Arizona. Seepage losses were calculated from data on inflow, evaporation and change in storage. Water samples were obtained from shallow suction cups, a 40 ft. and a 60 ft. PVC well and a 100 ft. access tube, all located inside the lagoon. Samples from these wells, together with water samples from the lagoon, were examined for coliform organisms and various physical and chemical constituents. Of special concern were transformations in nitrogen. Estimated seepage rates in the lagoon during inundation ranged from 0.20 ft. per day to 0.10 ft. per day. Water level observations in wells reflected the percolation of effluent to the water table, 70 ft. below land surface. Initially, the nitrate ion levels in the suction cup samples were high, manifesting the leaching of indigenous soil nitrogen. With the onset of anaerobic conditions at the base of the lagoon, nitrification was inhibited at the soil surface and ammonia became the predominant form of nitrogen in the soil solution. Sorption of ammonium ion appeared to occur on clay particles in a soil zone of high cation exchange capacity. There were no undesirable microbial or chemical effects of recharge from lagoon seepage on native groundwater quality.
W74-01972

RECOVERY OF MERCURY IN SOLUTION,
Agricultural Research Service, Fort Collins, Colo. Plant Science Research Div.
G. W. Maag, and R. J. Hecker.
J Environ Qual. Vol 1, No 2, p 192. 1972.
Identifiers: Aluminum, *Mercury recovery, Pollutant, Sewage, *Separation techniques, *Ion exchange, *Waste water treatment, Waste disposal.

Hg in the metallic or ionic form is a poisonous pollutant when added to the sewage system. Analytical laboratories frequently use solutions which

contain Hg salts. Proper disposal of the waste solution is a problem. A recovery method is described in which Al releases its higher energy valence electrons to the Hg ions in solution, producing Al ions and metallic Hg. The metallic Hg is recovered; the waste solution containing the Al ions can be poured down the drain.--Copyright 1973, Biological Abstracts, Inc.
W74-01995

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S SAVANNAH RIVER, S.C., PRODUCTION SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.

Available from USAEC Tech. Inf. Center, P. O. Box 62, Oak Ridge, Tn. 37830; free. Report No. TID-3341, Aug. 1973. 39 p, 197 abstracts.

Descriptors: *Bibliographies, *Abstracts, Radioactivity, *Nuclear wastes, *Effluents, *Radioactive waste disposal, *South Carolina, Administrative agencies, Regulation, Air pollution, Water pollution, Soil contamination, Ecology, Food chains, Public health, Water pollution sources, Geology, Hydrology, Meteorology.
Identifiers: *Savannah River (S.C.), *Waste management.

This bibliography contains abstracts of 197 technical reports and journal articles which have appeared in Nuclear Science Abstracts from January 1951 through July 1973 pertaining to radioactive waste management at the Savannah River site. The abstracts are grouped into ten categories, they are arranged by NSA volume and abstract number. The ten categories are as follows: Environs Monitoring, Ecology, and Radiological Surveys; Savannah River Studies; Ground Disposal and Soil Studies; Geology, Hydrology, and Meteorology; Stack Disposal; Waste Storage Tanks and Corrosion Problems; Waste Fixation and Solidification; Waste Processing and Properties; Waste Management; and Miscellaneous. (Houser-ORNL)
W74-02008

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S NATIONAL REACTOR TESTING STATION, IDAHO.
Technical Information Center (AEC), Oak Ridge, Tenn.

Available from USAEC Tech. Inf. Center, P. O. Box 62, Oak Ridge, Tenn. 37830, free. Report No. TID-3342, Aug. 1973. 59 p, 272 abstracts.

Descriptors: *Bibliographies, *Abstracts, Radioactivity, *Nuclear wastes, *Radioactive waste disposal, *Idaho, Regulation, Administrative agencies, Air pollution, Water pollution, Water pollution sources, Soil contamination, Food chains, Public health, Hydrology, Geology, Meteorology, Ecology, Environment.
Identifiers: *National Reactor Testing Station, *Waste management.

This bibliography contains abstracts of 272 technical reports and journal articles which have appeared in Nuclear Science Abstracts from January 1951 through July 1973 pertaining to radioactive waste management at the National Reactor Testing Station. The abstracts are grouped into nine categories. Within the categories, they are arranged by NSA volume and abstract number. The nine categories are as follows: Environs Monitoring, Ecology, and Radiological Surveys; Ground Disposal and Soil Studies; Geology, Hydrology, and Meteorology; Stack Disposal; Waste Storage Tanks and Corrison Problems; Waste Fixation and Solidification; Waste Processing and Properties; Waste Management; and Miscellaneous. (Houser-ORNL)
W74-02009

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S OAK RIDGE, TENN. SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.

Available from USAEC Tech. Inf. Center, P. O. Box 62, Oak Ridge, Tn. 37830; free. Report No. TID-3343, Sept. 1973. 85 p, 448 abstracts.

Descriptors: *Bibliographies, *Abstracts, Radioactivity, *Nuclear wastes, *Radioactive waste disposal, Tennessee, *Tennessee River, Air pollution, Water pollution, Water pollution sources, Soil contamination, Hydrology, Geology, Ecology, Meteorology, Food chains, Path of pollutants, Public health, Administrative agencies, Regulation.
Identifiers: *Clinch River (Tenn.), *Waste management.

This bibliography contains abstracts of 448 technical reports and journal articles which have appeared in Nuclear Science Abstracts from 1948 through July 1973 pertaining to radioactive waste management at the Oak Ridge site. The abstracts are grouped into ten categories. Within the categories, they are arranged by NSA volume and abstract number. The ten categories are as follows: Environs Monitoring, Ecology, and Radiological Surveys; White Oak Lake and Clinch River Studies; Ground Disposal and Soil Studies; Geology, Hydrology, and Meteorology; Stack Disposal; Waste Storage Tanks and Corrosion Problems; Waste Fixation and Solidification; Waste Processing and Properties; Waste Management; and Miscellaneous. (Houser-ORNL)
W74-02010

RADIOACTIVE WASTE MANAGEMENT IN ITALY,
Comitato Nazionale per L'Energia Nucleare, Rome (Italy).
G. Branca, F. Gera, M. Mirone, and F. Velona.
Available from Energia Nucleare, Vol. 19, No. 1, Jan. 1972. Energia Nucleare, Vol 19, No 1, p 17-25, January 1972. 4 tab, 6 ref.

Descriptors: *Nuclear powerplants, *Radioactivity, *Environment, *Radioactive waste disposal, Radioisotopes, Waste treatment, Water pollution, Oceans, Water pollution sources, Sea water, Gases, Liquid wastes, Solid wastes, Soil contamination.
Identifiers: *Italy, *Land burial.

Current practices of radioactive waste management in Italy are described. Amounts of waste produced by the nuclear power industry, nuclear research centers and radioisotope applications are estimated. The various methods of treatment for gaseous, liquid and solid waste are reviewed. The waste disposal practices in Italy include release of gaseous and liquid effluents to the environment and on-site burial or sea dumping of solid waste. Changes in waste treatment practices are likely to include solidification of high-level liquid waste and advanced decontamination techniques for gaseous and liquid effluents. In relation to solid waste disposal the evolution of present management schemes will probably include the development of centralized burial grounds. A discussion follows on the evolution of waste management criteria as a consequence of the extremely long confinement time that will be required in the future by the increasing amount of transuranics contained in the waste. (Houser-ORNL)
W74-02014

COMBINATION SEWAGE TREATMENT AND COOLING SYSTEM,
Cherne Industrial, Inc., Edina, Minn. (Assignee).
L. J. Boler.
U. S. Patent No. 3,760,946, 8 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1292, September 25, 1973.

Descriptors: *Patents, *Sewage treatment, *Liquid wastes, *Aeration, Bacteria, Condensation, Water quality control, *Waste water treatment, Water pollution control, Pollution abatement.
Identifiers: *Cooling systems.

Liquid sewage is conveyed along an extended continuous loop or recirculating path. Additional sewage can be introduced at least at one path along the conduit. A portion of the liquid is fed through cooling condensers of an operating plant and back into the sewage treatment conduit. The system includes propulsion and treating devices for maintaining at least a minimum rate of flow and for aerating the liquid. Liquid is removed from the sewage treatment conduit to settling tanks at a rate equal to the rate of incoming flow less evaporation and other losses. Sewage solids (with bacteria) in the settling tanks are returned to the treatment conduit near the entrance of the original raw sewage. The returned sewage seeds the raw sewage with colonies of active bacteria. (Sinha - OEIS)
W74-02028

WATER CONDITIONING SYSTEM,
Vulcan Labs., Inc., Pontiac, Mich. (assignee).
For primary bibliographic entry see Field 05F.
W74-02031

WAVE-POWERED AERATOR,
W. E. Palmer.
U. S. Patent No. 3,758,083, 3 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 591, September 11, 1973.

Descriptors: *Patents, *Aerators, Oxygen, Nitrogen, *Waste water treatment, *Waves (Water), Lakes, Pollution abatement, Startification, Water quality control, Water pollution control.
Identifiers: *Wave energy.

An aerator comprises a long train or string of air chambers connected by means of check valves. The chambers alternate between rigid and flexible or compressible chambers. The chain extends downward beneath the surface of a body of water. Pressure differentials in the water caused by waves force the air into successively lower chambers until it reaches the bottom where it is released. The air released is formed in large bubbles, and these pass up through the entire depth to reach the surface, breaking up the stratification, while at the same time providing an extended period of time in which the compressed air is in contact with the bottom water. Not only does this invention add to the dissolved oxygen and nitrogen content to combat pollution, but it does so at the bottom where it is most needed. By using energy provided by waves only, power is saved. (Sinha - OEIS)
W74-02032

TWO-WAY FILTER,
A. S. Toth.
U. S. Patent No. 3,757,954, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 558, September 11, 1973.

Descriptors: *Patents, *Waste water treatment, *Filtration, *Filters, Water pollution control, Water quality control, Pollution abatement.

This apparatus makes possible selective filtration of different sizes of suspended solids by having the larger sizes conveyed gravitationally downward, and smaller sizes conveyed upward by the flow of water to the upper filter bed. There is provision for separate discharge and collection of

the two separate volumes of filtered fluid. Valves are adapted to close and open the influent member and the effluent conduits. A valved back-wash conduit is provided at the lower area of the vessel, together with an air-pressure inlet. (Sinha - OEIS)
W74-02033

WASTE WATER TREATMENT PACKAGE PLANT HAVING A MODULAR DITCH MEMBER,
D. D. Zebley.
U. S. Patent No. 3,757,950, 7 p, 8 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 557, September 11, 1973.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Chlorination, Pollution abatement, Water quality control, Water pollution control.

A package plant for waste water treatment is constructed in a modular fashion for installation inside or outside a building. It includes an elliptical ditch that receives waste water and has a controlled aerator. The ditch has a central supporting arrangement wherein a settler tank and a chlorination tank are mounted in separate, removable and side by side communicating fashion. The settler tank receives controlled over-flow from the ditch and acts mechanically to return sludge to the ditch. Clear water passes to the chlorination tank and is then aerated and recycled directly to the building for reuse. (Sinha - OEIS)
W74-02034

TREATMENT OF PULP MILL WASTES,
Betz Labs., Inc., Trevose, Pa. (assignee).
A. M. Stern, and L. L. Gasner.
U. S. Patent No. 3,737,374, 5 p, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 911, No 1, p 206, June 5, 1973.

Descriptors: *Patents, *Waste water treatment, *Pulp wastes, Lignins, Color, Biodegradation, *Microbial degradation, *Pseudomonas, Ozone, *Oxygenation, Fermentation, *Industrial wastes, Pollution abatement, Water quality control, Water pollution control.

A method for improving the color characteristics of pulp mill wastes and for utilizing the product to produce valuable materials or chemicals is provided. The first step is that of oxidatively treating the lignin so that it is depolymerized to produce nutrient carbon substrates containing low molecular weight structures. The nutrients are then treated with a microbial population to produce fermentation. The microbial population is selected from the group consisting of Pseudomonads, Aspergillus niger A.T.C.C. 16888; Aspergillus niger A.T.C.C. 9029; Penicillium chrysogenum A.T.C.C. 10002; and Acetobacter suboxydans A.T.C.C. 621. (Sinha - OEIS)
W74-02038

COLOR REMOVAL FROM KRAFT MILL AQUEOUS EFFLUENTS,
United States Plywood-Champion Papers, Inc., New York. (assignee).
H. A. Fremont.
U. S. Patent No 3,758,405, 4 p, 4 fig, 3 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 665, September 11, 1973.

Descriptors: *Patents, *Pulp wastes, *Industrial wastes, Chemical reactions, *Color, Oxygen, *Waste water treatment, Pollution abatement, Water quality control, Water pollution control, Hydrogen ion concentration.

A continuous method of removing and disposing of organic color bodies found in liquid effluents from Kraft pulp manufacturing operations is presented. The first step is that of adjusting the pH from about neutrality to about 9. The effluent is then subjected to ultrafiltration to form an aqueous permeate and a retenate containing all of the color bodies. The retentate is heated in the presence of oxygen at a temperature and for time sufficient to oxidize the color bodies to colorless inorganic salts and inorganic gases. (Sinha - OEIS)
W74-02039

CONTINUOUS PROCESS FOR THE AIR OXIDATION OF SOUR WATER,
Texaco Inc., New York. (assignee).
D. E. McCoy, R. M. McEachern, and R. M. Dille.
U. S. Patent No 3,761,409, 3 p, 2 fig, 1 tab, 1 ref; Official Gazette of the Untied States Patent Office, Vol 914, No 4, p 1403, September 25, 1973.

Descriptors: *Patents, *Waste water treatment, *Oxidation, *Sulfates, *Sulfur compounds, Chemical reactions, Water quality control, Water pollution control, Pollution abatement.

This invention relates generally to air and water pollution abatement, and more particularly to a continuous, liquid phase, air oxidation process for converting sulfur compounds present in water to non-pollution, non-oxygen demanding sulfates. A continuous process is described for the liquid phase air oxidation of water containing sulfide anion and at least one other sulfur containing anion selected from the group consisting of thiosulfates, tetrathionates, polythionates, sulfites and polysulfides to convert said to sulfites. The steps are: adjusting the pH of the water to between about 6 to 13, heating the water to a temperature ranging from about 250 to 520 degrees F.; oxidizing the heated water under a pressure of around 75 to 800 p.s.i.g. at a liquid hourly space velocity of between 0.5 to 12.0 volumes of feed per reactor void volume with a noncatalytic, oxidizing medium containing from 0 to 500% excess oxygen basis stoichiometric conversion of sulfide to sulfates and recovering an effluent containing substantially no anion other than the sulfate. (Sinha - OEIS)
W74-02041

LIQUID AERATING ROTOR ASSEMBLY,
Cherne Industrial, Inc., Edina, Minn. (assignee).
L. J. Boler, N. S. Hanssen, B. J. Beaulieu, L. G. Cherne, and H. O. Halvorson.
U. S. Patent No 3,759,495, 8 p, 9 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 3, p 937, September 18, 1973.

Descriptors: *Patents, *Sewage treatment, *Aeration, *Rotors, *Waste water treatment, Equipment, Water pollution control, Water quality control, Pollution abatement.

This invention makes it possible to selectively control the particular portions of liquid in a sewage treatment conduit which are to be preferentially subjected to aeration. When a rotor is used which projects substantial quantities of liquid both downstream and upstream from the aeration rotor location, a deflecting surface prevents any substantial liquid portions projected in an upstream direction from re-entering the direct path of the liquid toward the rotor. Thus, the rotor can be positioned and operated so that it operates on that portion of the sewage liquid which has the greatest need of aeration, without consuming substantial power requirements in the immediate further aeration of liquid portions which have already reached a substantially higher level of oxygen content. Selective positioning of a deflector upstream or downstream from the rotor helps control the rate of liquid flow. (Sinha - OEIS)
W74-02042

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME I - SUMMARY,
Metcalf and Eddy, Inc., Palo Alto, Calif.
C. E. Pound, and R. W. Crites.
Copy available from GPO Sup Doc as EP1.23: 660-73-006a, $1.00; microfiche from NTIS as PB-225 940, $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-006a, August 1973. 80 p, 3 fig, 15 tab, 64 ref.

Descriptors: *Irrigation systems, *Land management, *Water reuse, Design criteria, *Waste water treatment, Costs, *Groundwater recharge, *Public health, Environmental effects, *Sewage treatment, Industrial wastes, Climatic zones, Reclaimed water, Waste water disposal, Soil treatment, History, Crops, Percolation, Recycling.

A nationwide study was conducted of the current knowledge and techniques of land application of municipal treatment plant effluents and industrial wastewaters. Selected sites were visited and extensive literature reviews were made (annotated bibliography will be published separately). Information and data were gathered on the many factors involved in system design and operation for the three major land application approaches: irrigation, overland flow, and infiltration-percolation. In addition, evaluations were made of environmental effects, public health considerations, and costs--areas in which limited data are available. Irrigation is the most reliable land application technique with respect to long term use and removal of pollutants from the wastewater. It is sufficiently developed so that general design and operational guidelines can be prepared from current technology. Overland flow was found to be an effective technique for industrial wastewater treatment. Further development is required to utilize its considerable potential for municipal wastewater treatment. Infiltration-percolation is also a feasible method of land application. Criteria for site selection, groundwater control, and management techniques for high rate systems need further development. (See also W74-02044) (EPA)
W74-02043

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
Metcalf and Eddy, Inc., Palo Alto, Calif.
C. E. Pound, and R. W. Crites.
Copy available from GPO Sup Doc as EP1.23: 660-73-0066, $2.40; microfiche from NTIS as PB-225 941, $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-006b, August 1973. 249 p, 14 fig, 34 tab, 142 ref. EPA Program Element 1B2045, Contract 68-01-0741.

Descriptors: *Land management, *Water reuse, *Bibliographies, Irrigation systems, Design criteria, *Waste water treatment, Costs, *Groundwater recharge, *Public health, Environmental effects, *Sewage treatment, Industrial wastes, Climatic zones, Reclaimed water, Waste water disposal, Soil treatment, History, Crops, Percolation, Recycling.

Recommendations include: (1) When evaluating land application approaches for treatment as compared to conventional or advanced waste treatment processes, factors such as economics, simplicity of operation, and degree of renovation should be considered as well as the potential water reuse and the best use to be made of the land. (2) To gain public acceptance and support for land application projects, realistic implementation programs, including public relations, should be developed to accompany any planning activities for wastewater management. (3) The operation of many existing systems can be enhanced through analysis of successful practices at other locations, evaluation of the key factors important to management, and initiation of monitoring of water quality changes throughout the system. (4) Design and operation practices in land application are so dependent on local conditions that a detailed design or operations manual would likely stifle, rather than advance, the state-of-the-art. (See also W74-02043) (EPA)
W74-02044

SLIDE GLASS METHOD FOR TESTING SLIME IN INDUSTRIAL WATER AND WASTE (IN JAPANESE),
Tokyo Univ. (Japan). Faculty of Pharmaceutical Sciences.
For primary bibliographic entry see Field 05A.
W74-02073

ECONOMIC GUIDELINES FOR PUBLIC UTILITIES PLANNING,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
. S. Dajani, and R. S. Gemmell.
ournal of the Urban Planning and Development Division, American Society of Civil Engineers, Vol 99, No UP2, Proceedings paper No. 9977, p 71-182, September 1973. 3 fig, 3 tab, 13 ref. OWRR A-042-ILL (2).

Descriptors: *Sewers, *Design, Networks, Waste water (Pollution), *Treatment facilities, Size, Treatment, *Costs, Diseconomies of scale, Algorithms, *Utilities, Population, Density, Installation costs, Mathematical models, Systems analysis, Optimization.
Identifiers: *Economic analysis, Urban development, Nonlinear programming.

The wastewater collection utility is used to demonstrate the need and possibility of developing a normative mathematical relationship between the cost of installing such a utility on the one hand and the area being served and population density on the other. On the basis of an analysis of optimal network designs which were obtained by a nonlinear programming algorithm, diseconomies of scale exist with increasing network size. This implies that a number of smaller and simpler networks may be constructed at a greater economy than a large enveloping system and treatment plant size. The combination of these factors--the network costs and the treatment costs--indicates that a minimum per capita cost solution exists. The size of the system at which a minimum cost is obtained is highly sensitive to the density of the population in the area being served but is relatively insensitive to the size of the service area. (See also W71-11861) (Bell-Cornell)
W74-02114

COMPREHENSIVE SEWERAGE PLAN FOR GRAND ISLAND, NEBRASKA.
Black and Veatch, Kansas City, Mo.

City of Grand Island, Nebraska, June 25, 1968. 45 p, 1 fig, 5 tab.

Descriptors: *Comprehensive planning, Sewerage, *Forecasting, *Future planning (Projected), Sewage treatment, Sewage disposal, Hydraulic structures, Urbanization, Sewers, Construction costs, Financing, *Nebraska, *Waste water treatment.
Identifiers: *Grand Island (Neb).

Anticipated future growth of the area surrounding the city of Grand Island, Nebraska requires planning for the provision of sewerage. An area of 12,000 acres which presently is not served by sewers was studied along with an area of 7,500 acres that is served by sewers. Population estimates indicate that a potential of 90,000 people will reside within the unserved area, and 32,000 people within the serviced area, by year 2050. The report includes analyses of these population projections to determine patterns of growth. Land use patterns were similarly studied, and both short-term (10 years and less) and long-term (over 10 years) plans of action were developed. Cost estimates and methods of financing were discussed, as were methods of keeping the plan up dated. For all foreseeable construction, the estimated cost is set at $19,577,000, of which $2,431,000 is described as immediate construction. Primarily, the improvements required consist of the construction of additional sewers. Some expansion of the treatment facilities will also be needed. Financing methods considered include: (1) federal grants, (2) state aid, (3) general city tax funds, (4) sewer user fees, and (5) municipal bonds. (Poertner)
W74-02123

TECHNICAL AND ECONOMIC EVALUATION OF EXISTING WASTEWATER TREATMENT FACILITIES AND ALTERNATIVE METHODS OF DISPOSAL OF TREATED EFFLUENT, HOUSTON, MISSOURI.
Bartholomew (Harland) and Associates, St. Louis, Mo.

Prepared for City of Houston, Missouri, July 1972. 111 p, 13 fig, 22 tab, 16 ref, 3 append.

Descriptors: *Return flow, *Water pollution control, *Sewage disposal, *Sewage treatment, *Missouri, Sewage effluents, Water pollution sources, Municipal wastes, Waste water disposal, Soil disposal fields, Sewage lagoons, *Treatment facilities.
Identifiers: *Houston (Missouri).

The City of Houston, Missouri was put under orders by the State to develop a system to prevent any discharge of sewage effluent to the Big Piney River. The State had suggested evaporation or irrigation of the effluents. Evaporation was quickly eliminated as a feasible solution since precipitation exceeds evaporation in this geographical area. Irrigation of sewage effluent was studied in greater detail. But, although this method has been found to be feasible elsewhere, it is not recommended for the City of Houston. The most strenuous objection to this method involves the possibility of ground water pollution. Ground water pollution problems in the area are accented by both high ground water levels and low infiltration rates. Although it would be technologically feasible to use a very large acreage, with corresponding low infiltration rates, such a solution is not economically feasible. The study recommends that the State be petitioned to modify the orders from 'zero discharge' to a discharge compatible with water uses. (Poertner)
W74-02125

ENGINEERING DESIGN REPORT FOR SPRAY IRRIGATING WASTEWATER FROM THE SANITARY DISTRICT OF BEARDSTOWN AND THE OSCAR MAYER AND CO. MEAT PROCESSING PLANT.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for City of Beardstown, Illinois, December 1972. 41 p, 4 fig, 2 tab, 6 append.

Descriptors: *Waste water treatment, *Waste water disposal, *Soil disposal fields, *Illinois, Soil treatment, Irrigation, Municipal wastes, Industrial wastes, Water pollution control, Sprinkler irrigation, *Water reuse.
Identifiers: *Beardstown (Illinois).

The Beardstown, Illinois Sanitary District, along with Oscar Mayer and Co., studied spray irrigation for final treatment and disposal of sewage. A preliminary study showed that the method was feasible. More precise engineering details were developed in this report. A 1985 estimated design flow of 13,500,000 gallons was used, although flow rates from 9,000,000 gallons per week to 17,000,000 gallons per week are expected. Preliminary treatment will include ammonia stripping by lime treatment, chlorinations, and anaerobic lagoon treatment as well as aeration of the waste in intermediate ponds. Contamination of groundwater is not thought to be a significant problem, but constant monitoring of the groundwater is recommended. High ground water levels are present and existing ditches will be used to keep ground water levels at least 5 feet below the surface. The land is planned for agricultural use, and revenue as high as $20,000 a year is anticipated to help offset operating costs which are expected to be $59,000 annually. Total capital costs are estimated at $1.18 million plus $152,000 for additional anaerobic lagoons and aerated ponds for Oscar Mayer and Co. wastes. The total area involved will be 740 acres, of which 580 will be irrigated, and the remainder used for a buffer zone and treatment facilities. (Poertner)
W74-02126

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 04A.
W74-02129

WATER SUPPLY AND SEWERAGE SERVICES: TOOLS FOR AFFECTING THE QUALITY OF LIFE IN FORSYTH COUNTY, N.C., VOLUME D IN THE LAND POTENTIALS SERIES.
City-County Planning Board, Winston-Salem, N.C.

1971. 60 p, 9 fig, 10 tab.

Descriptors: *Water supply, *Sewerage, *Regional development, *Land use, Regional analysis, Urbanization, *North Carolina, Environmental control, Environmental sanitation, Non-structural alternatives.
Identifiers: *Forsyth County (NC), *Winston-Salem (NC).

The future growth of Forsyth County, North Carolina and the influence of water supply and sewerage services were investigated. Instead of merely supplying water and sewerage to developing areas, it was found that development can be controlled by supplying these services on a selective basis. This can lead to better service at a lower cost, and a more efficient service, than if water and sewerage are provided for uncontrolled growth. This concept can also be beneficial in protecting the quality of life. It is an efficient means of zoning, and can be used to protect the quality of the soil, air and water. Planning for growth by selective installation of water and sewerage facilities can identify areas that should be left in their undeveloped states, as well as protecting water quality by providing adequate sewage treatment. However, there are serious problems to be overcome, including intergovernmental cooperation and accurate forecasts of future growth. Based on 1950-1960 growth projections, the population in the year 2,000 was estimated at 420,000. (Poertner)
W74-02130

UNITARY WATER SUPPLY AND SEWERAGE SERVICES.
City-County Planning Board, Winston-Salem, N.C.

June 1973. 31 p, 2 fig, 9 tab, 24 ref, 3 appendices.

Descriptors: *Water supply, *Sewerage, *Planning, Water resources development, Regional development, Administration, *North Carolina, Management.
Identifiers: *Forsyth County (N.C.).

Methods for providing public sewerage in Forsyth County, North Carolina, were studied. It was concluded that a unitary community system for collection, treatment, and disposal would be more efficient than independent systems on both short-term and long-term bases. Such a system would also have important side benefits. A unitary system can be used to regulate growth or channel growth by selective provision of service. A quasi-autonomous authority could be used to run the system, and be held responsible to local govern-

ments through budget review and other measures. Such a system would provide for unified service across a regional area and would require the cooperation of local governmental units. The statutory authority for establishing a consolidated management system presently exists. It is concluded that a consolidated system is inevitable. The major problem concerns when the consolidation will occur and how it will be brought about. (Poertner)
W74-02131

MUNCIE SANITARY DISTRICT, 1972, 8TH ANNUAL REPORT.
Muncie Sanitary District, Ind.

1972. 60 P, 5 FIG, 40 TAB.

Descriptors: Documentation, *Data collections, *Municipal wastes, *Sewage treatments, Environmental sanitation, Water pollution control, Waste water treatment, Publications, *Indiana.
Identifiers: *Muncie (Indiana).

The Municie (Indiana) Sanitary District recently organized a Water Quality Section to deal with water pollution problems. The 1972 annual report of the District contains the first annual report of the Water Quality Section along with the annual report of the entire district. The general report includes sections on: (1) personnel, (2) precipitation, (3) sewage characteristics, (4) level of treatment, (5) sewer maintenance, and (6) a financial statement. The Water Quality Section was established to prevent and control water pollution in local waters. Efforts to clean local waters began in the 1940's when the first stream law was passed. In June 1970, the District hired a natural resource consultant to deal with area pollution. The staff was subsequently enlarged and increased to 8 people in March 1972. Five automatic samplers have been permanently installed in the field to continuously monitor industrial wastes which constitute 20 percent of Muncie's water pollution problems. The remaining 80 percent is attributed to raw sewage discharges from residential areas, storm overflows, and non-functioning septic tanks. The cooperation and participation of the populace is solicited and recommendations are made to keep informed, to become involved in local conservation organizations and to report violations of water pollution. (Poertner)
W74-02133

COMPARISON OF SEWER DISCHARGE HYDROGRAPHS COMPUTED FROM IN-SEWER MEASUREMENTS AND FROM SYNTHESIZED HYDROGRAPH PROCEDURES, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for City of St. Paul Department of Public Works, Minnesota, March 16, 1971. 32 p, 11 fig.

Descriptors: *Sewers, *Runoff forecasting, Hydrology, *Hydrographs, *Synthesis, *Hydrograph analysis, Runoff, Drainage, Urban drainage, Hydrologic systems, Hydrologic data, *Minnesota, Theoretical analysis, Measurement, Assay.
Identifiers: *St. Paul (Minn).

A study was made to compare measured sewer hydrographs with computed hydrographs for sewers in St. Paul, Minnesota. This comparison was performed to determine the validity of using synthesized hydrograph procedures in designing sewer overflow control facilities. Eleven rainfall events were analyzed by both methods. Data from the sewers were analyzed, and in some cases modified, by the St. Anthony Falls Hydraulic Laboratory of the University of Minnesota. Generally, the modification resulted in closer agreement in mass discharges when comparing the developed hydrograph with the computed mass discharge. A synthesized hydrograph was then prepared and plotted for each of the eleven rainfall events. Comparison of mass discharge volume resulted in agreement within 8 percent for 6 of the storms and within 16 percent in 3 of the storms. Using transparent overlays, it was found that the configuration of the synthesized hydrograph is generally the same as the measured hydrograph. In the cases that the configurations are not similar, possible explanations for the dissimilarity are suggested. It was concluded that the use of synthesized hydrographs is an acceptable method. (Poertner)
W74-02135

STUDY OF SEWER SEPARATION: PHASE I, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.

City of St. Paul, Department of Public Works, Minnesota, September 1968. 45 p, 19 fig, 1 tab, 3 appendices.

Descriptors: *Sewers, *Sewerage, *Water pollution sources, *Water pollution control, Interceptor sewers, Separated sewers, Outfall sewers, Combined sewers, Urban drainage, Drainage systems, *Minnesota, Mississippi River, Water pollution.
Identifiers: *St. Paul (Minn).

The overflow from combined sewers of the City of St. Paul, Minnesota was causing pollution in the Mississippi River. Six alternatives were studied to allievate this pollution. The Minnesota Pollution Control Agency set criteria that practically requires the solution to the problem to the equivalent of separation of the combined sewer system. The six alternatives studied are: (1) complete separation, (2) partial separation, (3) an increase in interceptor sewer and treatment plant capacity, (4) storage of combined flows, (5) disinfection of combined flows, and (6) regulation of the combined sewer system. Regulation of the sewer system was being undertaken by the Minneapolis-St. Paul Sanitary District at the time of this study. A preliminary plan was suggested by this study, consisting of a composite of some of the features of the alternatives. In some areas, separation of sewers is recommended, with the exception of roof drain water still flowing to the sanitary sewers. In other areas, chlorinated interceptor sewers are recommended for combined overflows. In about 40 percent of the city, storm sewers would carry runoff directly to the Mississippi River. A second phase of this study will more closely examine this plan and study possible modifications. (Poertner)
W74-02136

5E. Ultimate Disposal of Wastes

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
D. L. Warner.
Available from NTIS, Springfield, Va. 22151 AD-756 643 Price $9.00 printed copy; $1.45 microfiche . Final Technical Report, June 1972. 684 p. GS 14-08-0001-12280 ARPA Order No 1684.

Descriptors: *Water pollution control, *Industrial wastes, *Injection wells, *Waste disposal, Reviews, United States, Sites, Drilling, Geology, Hysrogeology, *Well data, Waste treatment, Well regulations, Economics, *Surveys, Data collections.
Identifiers: *Waste injection wells survey.

This survey of industrial waste injection wells in the United States furnishes the following information (when available) for each well: (1) operating company and general well location; (2) well location (legal description); (3) history, system planning, construction and operation; (4) geology and geohydrology; (5) well design and construction; (6) description of surface equipment; (7) cores, samples, and logs; (8) waste characteristics; (9) preinjection waste treatment; (10) well operation and operating history; (11) regulatory; (12) economics; and (13) sources of information and published references. (See also W73-12051 and W73-12576) (Woodward-USGS)
W74-01714

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S SAVANNAH RIVER, S.C., PRODUCTION SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02008

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S NATIONAL REACTOR TESTING STATION, IDAHO.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02009

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S OAK RIDGE, TENN. SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02010

GROUND DISPOSAL OF REACTOR COOLANT EFFLUENT,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05B.
W74-02013

DISPOSAL OF WASTE HEAT,
Department of the Interior, Washington, D.C. (Assignee).
For primary bibliographic entry see Field 05B.
W74-02029

FLOATABLE-SUBMERSIBLE VESSEL CONTAINER,
Nuclear Waste Systems Co., Campbell, Calif. (assignee).
For primary bibliographic entry see Field 05B.
W74-02040

THE STATUS OF THE RADIOACTIVE WASTE DISPOSAL PROBLEM,
For primary bibliographic entry see Field 05B.
W74-02054

TECHNICAL AND ECONOMIC EVALUATION OF EXISTING WASTEWATER TREATMENT FACILITIES AND ALTERNATIVE METHODS OF DISPOSAL OF TREATED EFFLUENT, HOUSTON, MISSOURI.
Bartholomew (Harland) and Associates, St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02125

5F. Water Treatment and Quality Alteration

WATER QUALITY AND HUMAN HEALTH,
Ministry of Health, New Delhi (India).
T. Viraraghavan.
Journal of the American Water Works Association, Vol 65, No 10, p 647-650, October 1973. 3 photos, 33 ref.

Descriptors: *Water quality, *Public health, Diseases, *Potable water, *Water pollution, Viruses, Coliforms, Pathogenic bacteria, Nematodes, Water supply, Water treatment.
Identifiers: Cholera, Poliomyelitis, Hepatitis, Raw water.

In the U.S. between 1946-1960, over 26,000 cases of water-related illnesses were reported. Use of untreated groundwater was a disproportionate cuase of illness. Viruses in municipal water supplies are said to have caused a 1955-56 cholera epidemic of 28,745 cases in New Delhi and a 1944-45 epidemic in Pennsylvania. There is a suggestion that viruses may be slipping through present water treatment methods, in some cases because raw water concentrations of viruses are too high. The use of coliform counts as surrogate measures for virus presence is discussed, with the conclusion that the practice is satisfactory. Chances of nematodes ingesting pathogens and being carried through the water system in a day are extremely small. The needs for surveillance of relationships between soft drinking water and heart disease, long-term mercury concentrations and health, and nitrates and disease are pointed out. Probably most of the new contaminants reaching public eater supplies are organic compounds which come from insecticides, fertilizers, detergents, auto fuels, lubricants, paints, and other industrial products. Of the $144 million spent for water research in 1968, only $2 million was spent for health-related research; more research on the effects of exotic contaminants is needed. (Stein-North Carolina)
W74-01865

ORGANISMS IN PUBLIC WATER MAINS AND THEIR SIGNIFICANCE FOR DRINKING WATER AS FOOD, (IN GERMAN),
Wasserwirtschaftsdirektion Mittlere Elbe-Sude-Elde, Magdeburg (East Germany).
H. Klapper, and W. Schuster.
Angew Parasitol. Vol 13, No 2, p 83-90. 1972. Illus. (English summary).
Identifiers: Animals, *Bacteria, Eradication, Human, Organisms, *Potable water, *Taste, Water mains.

The infestation of public eater mains with living organisms is widespread. The consumers are nauseated by visible contamination with living animals which are also hygienically dangerous. After the organisms die, the bacterial count is increased, and the drinking water has a bad taste. Eradication is necessary. Methods for killing the organisms without interrupting the water supply are shown.--Copyright 1973, Biological Abstracts, Inc.
W74-01898

WATER RESOURCES OF THE RUSTON AREA, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 04B.
W74-01921

APPARATUS PARTICULARLY USEFUL FOR CHLORINATING A RESERVOIR,
J. M. Morrison.
U. S. Patent No. 3,760,947, 6 p, 16 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1292, September 25, 1973.

Descriptors: *Patents, *Reservoirs, *Pollution abatement, *Chlorination, Swimming pools, *Water treatment, Water quality control, Water pollution control, Environmental sanitation.

A long thin flexible teflon tube extends in a drain line of a reservoir from the point where the line opens into the bottom of the reservoir to a point outside the reservoir. Outside the reservoir the tube is removably connected to a chlorine gas bottle. At the point where the tube is connected to the bottle a fixed metering port is provided. There is also provided a protector tube surrounding the thin tube from the drain line to the chlorine bottle, and a gas diffuser is connected to the end of the thin tube where it opens into the reservoir. A method of installing the apparatus is described wherein one end of the thin tube is placed into the drain line at the bottom of the reservoir, and then, by drawing water from the reservoir through the drain line, the tube is drawn through the drain line to a point outside the reservoir, and then the tube is passed through a hole in the side of the line at a point outside the reservoir. The tube is then connected to a chlorine gas bottle. (Sinha-OEIS)
W74-02027

WATER CONDITIONING SYSTEM,
Vulcan Labs., Inc., Pontiac, Mich. (assignee).
F. J. Drayton, Jr.
U. S. Patent No. 3,759,387, 5 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 914, No 3, p 909, September 18, 1973.

Descriptors: *Patents, *Recirculated water, Reclaimed water, *Water reuse, Additives, *Water treatment.
Identifiers: Water conditioning.

A control system is described for regulating the introduction of various additives into a recirculating water system including a main control cabinet carrying a flow counter for makeup water and timers for controlling additive pumps to add corrosion inhibitor, alkalinity control agents, or other additives after a predetermined quantity of makeup water has been added to the system. The main control unit further includes a clock and a bistable control device for alternately introducing distinct biocides from first and second supplies to the recirculating water. Level detectors and alarm devices are provided for the additive supply containers. The control system further provides a timer for controlling the operation of a bleed-off solenoid valve to control the dissolved solids level in the recirculating water system. (Sinha - OEIS)
W74-02031

SERUM ELECTROLYTES AND SKELETAL MINERALIZATION IN HARD- AND SOFT--WATER AREAS,
For primary bibliographic entry see Field 05C.
W74-02053

INDEX OF DRINKING WATER POLLUTION: TOTAL COLIFORM MPN TESTS: CONFIRMED TEST VERSUS COMPLETED TEST,
British Columbia Provincial Lab., Vancouver.
For primary bibliographic entry see Field 05A.
W74-02087

5G. Water Quality Control

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-01714

EVALUATIONS OF ABATE FOR MOSQUITO CONTROL IN POLLUTED WATER,
J. L. McDonald.
Mosq News, Vol 32, No 4, p 627-631, 1972, Illus.
Identifiers: *Abate, Armigeres-subalbatus, Culex-fatigans, *Mosquito control, Polluted waters, Septic, Tanks, Water pollution control.

Three physical forms of Abate (Kobrite and perlite granules and Tossits) were evaluated with respect to their control of Culex fatigans and Armigeres subalbatus mosquitoes in polluted waters. Three ditches and 5 septic tanks with polluted waters (mosquito breeding sites) were used for this evaluation. Water flow rates dramatically influenced the length of the active period of Abata. Where water stands, Abate works best.--Copyright 1973, Biological Abstracts, Inc.
W74-01741

NITRATE IN UNSATURATED ZONE OF AN ALLUVIAL SOIL IN RELATION TO FERTILIZER NITROGEN RATE AND IRRIGATION LEVEL,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 02G.
W74-01774

NOTE ON BIOASSAY TRIALS ON THE EFFECT OF RAINFALL ON ACARICIDE RESIDUES,
Central Plant Protection Training Inst., Hyderabad (India).
For primary bibliographic entry see Field 05B.
W74-01777

ROLE OF THE FEDERAL GOVERNMENT IN CONTROLLING NUTRIENTS IN NATURAL WATERS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 05C.
W74-01808

DEVELOPMENT OF NUTRIENT CONTROL POLICIES IN CANADA,
Department of Energy, Mines and Resources, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05C.
W74-01809

EVALUATING WATER BASED RECREATION FACILITIES AND AREAS,
North Carolina State Univ., Raleigh. Dept. of Recreation and Park Administration.
For primary bibliographic entry see Field 06B.
W74-01831

POLLUTION ABATEMENT AND UNEMPLOYMENT. A METHODOLOGICAL STUDY,
Institute of Public Administration, Washington, D.C.
J. Hoicka, T. Trumbull, and H. Scott.
Available from NTIS as PB-207 109 $3.00 in paper copy, $1.45 in microfiche. Environmental Protection Agency, Rockville, Maryland, Office of Air and Water Programs, APTD-0921, January 1972. 146 p, 8 tab, 42 ref, 2 append. EPA-EHS 70-126.

Descriptors: *Pollution abatement, *Unemployment, *Air pollution, Methodology, Industries, Costs, Federal government, Estimating, Prices, Foreign trade, Financing, Model studies, Legal aspects.
Identifiers: Labor intensive industry, Capital intensive industry, Resource intensive industry.

A methodology is developed to estimate the magnitude of unemployment that may occur as a result of plant closures caused by pollution abatement requirements. It specifies types of financial assistance required to avoid closure, and describes the type of plants which are expected to be affected. Two types of plants were identified by the

methodology as being subject to closure in order to avoid the expense of pollution abatement. Non-viable plants, the smallest and most absolescent in each industry, are those which could not afford to pay for pollution abatement costs without subsidy and are thus expected to close causing unemployment. Although many of these plants would close within a few years regardless of pollution controls, a substantial number are found in areas of chronically high unemployment and if these industries are in some sense considered critical, further study is recommended. Potentially viable plants, those requiring only a loan for initial outlay for abatement equipment, are expected to be smaller in number and for the most part qualified for Small Business Administration loans. Limited availability of data resulted in a crude methodology, but three case studies apply it to labor, capital, and resource intensive industries. (Weaver-Wisconsin)
W74-01835

OPTIMAL CAPITAL ACCUMULATION IN A POLLUTED ENVIRONMENT,
Australian National Univ., Canberra.
B. A. Forster.
Southern Economic Journal, Vol 39, No 4, p 544-547, 1973. 10 ref.

Descriptors: *Gross national product, *Environmental effects, *Costs, *Capital, Pollution abatement, Model studies, Welfare (Economics).
Identifiers: *Environmental pollution, *Economic growth.

Usual emphasis upon the importance of economic growth overlooks the increasing production of waste associated with the growth. Thus, the effects of explicitly introducing pollution into the neoclassical growth model are investigated. Pollution present at any particular time is considered a function of the capital stock and level of pollution control expenditure at that time. The efficiency of pollution control is assumed to be decreasing with the increase of the level of expenditure involved. An objective of maximizing the discounted flow of utility over an infinite time horizon is assumed by the planning authority. This objective is subject to a set of conditions both constraining the level of pollution control and the time rate of change of the shadow price of capital, and requiring complete utilization of output, non-satiable utility for consumption, and maintenance of the stock of capital sufficient to compensate its depreciation. Analysis indicates that consideration of pollution results in a lower capital stock and a lower level of consumption than when pollution is ignored as in the neoclassical analysis. (Weaver-Wisconsin)
W74-01840

THE STEEL INDUSTRY AND ENVIRONMENTAL QUALITY.
National Industrial Pollution Control Council, Washington, D.C. Steel Sub-Council.

Report, August 1972. 22 p, 2 fig.

Descriptors: *Pollution abatement, *Industries, *Costs, Water pollution control, Air pollution, Waste disposal, Federal government, Standards, Regulation, Financing, Tax rates.
Identifiers: *Steel industry.

Typical accomplishments of the United States steel industry in their implementation of environmental control programs are summarized. A variety of major environmental pollutants arise from the steel fabricating process which are compounded by its massive scale thus contributing to the immensity of pollution control and abatement problems. Data indicate that the industry has budgeted a larger percentage of its capital expenditures for environmental improvement than any other industry. Case histories review recent actions and projects taken by specific firms. With regard to resource supplies, new techniques in recycling will ensure that scrap will continue to provide over 50% of the raw materials needed for new steel. Despite this progress, the expenditures required to meet future environmental improvement schedules would be a staggering burden for the industry given its current economic status. It is recommended that (1) pollutant removal standards be carefully determined through cost-benefit and efficiency analysis, (2) low interest federal loans be made available, (3) the feasibility of combined municipal-industrial treatment plants be investigated, (4) expenditures for non-productive pollution control facilities be deductible from Federal income tax, and (5) uncertainty be eliminated from standards so that facilities designed for pollution control do no become obsolete with changing regulations. (Weaver-Wisconsin)
W74-01841

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS. PART III.
Booz-Allen Public Administration Services, Inc., Washington, D.C.

Available from NTIS as PB-211 919 $5.45 in paper copy, $1.45 in microfiche. Council on Environmental Quality, Washington, D.C. July 1972. 125 p, 2 fig, 26 ref.

Descriptors: *Pollution abatement, *Economic impact, *Costs, Air pollution, Regulation, Industries, Industrial production, Regional economics, Unemployment.
Identifiers: *Steel industry.

Based on sustained economic growth of at least 4% per year for the period 1972-1976, steel consumption is predicted to be in the 120-130 million ton range by 1976. Potential net steel shipments, capacity limitations aside, are predicted to be between 106-113 million tons per year by 1976 given estimated domestic consumption and import penetration. Estimated current sustainable steel shipment capacity based on partial and incomplete information is between 98 and 105 million tons per year. To meet the potential shipments estimated for 1976 total domestic steel capacity may require expansion by as much as 16 million tons. Required capital expenditures to modernize and maintain existing plant and equipment during the period 1972-1976 are estimated to total $6.85 billion (1971 dollars). Expenditures needed to increase capacity may be as much as $6.53 billion for the same period. Based on pollution control cost estimates supplied by the Council for Environmental Quality and predicted accelerated capital expenditures to replace equipment which can not economically be cleaned up, steel price increases of approximately 4.3% per year will be required if industry growth is to be maintained although this estimate is subject to many uncertainties. (See also W73-10312 and W73-12707) (Weaver-Wisconsin)
W74-01844

NATURAL CONCERN: AN ECOLOGICAL ANALYSIS OF BIBB COUNTY.
Macon-Bibb County Planning and Zoning Commission, Macon, Ga.
For primary bibliographic entry see Field 06G.
W74-01848

OPEN SPACE: PRELIMINARY PLAN.
Los Angeles Dept. of City Planning, Calif.
For primary bibliographic entry see Field 06G.
W74-01849

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.
For primary bibliographic entry see Field 06F.
W74-01850

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.

Part 4 of Environmental Enhancement Study, September, 1972. 193 p, 3 fig, 6 maps, 10 tab, 4 append. Supported in part by HUD 701 funds.

Descriptors: *Planning, *Water quality control, Water pollution, *Water pollution sources, Water pollution effects, *Legislation, *Pennsylvania, Water law, Regulation, Watersheds, Delaware River Basin Commission, Drainage, *Water quality standards.
Identifiers: *Citizen participation, Lehigh County (Penn), Northampton County (Penn).

The occurrence of water on the earth and the processes by which it reaches inland areas are discussed. The drainage network for Lehigh and Northampton Counties in Pennsylvania are identified as a hierarchical system consisting of the Delaware River, the Lehigh and Schuylkill Rivers, and smaller tributaries. The major types of water pollutants, the ways in which these substances or their influences are detected in streams, and the social and economic effects resulting from the presence of such contaminants are examined. Although actions to enact and enforce water pollution statutes are underway, both at the State and Federal levels in coordination with an interstate water agency, the Delaware River Basin Commission, the State of Pennsylvania has primary enforcement powers and responsibilities. The Pennsylvania approach features water quality standards based on use, with permits to discharge wastes being issued contingent upon restrictions as to the quantity and character of wastes that may be released. Comprehensive planning must include water quality considerations through such measures as codes and ordinances. Citizen participation in water pollution control is recognized as necessary and guidelines for citizen input are presented. (Hoffman-North Carolina)
W74-01852

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME ONE: INVENTORY FINDINGS AND FORECASTS.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01856

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME TWO: ALTERNATIVE PLANS AND RECOMMENDED PLAN.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01857

NORTH CAROLINA WATER PLAN--PROGRESS REPORT, CHAPTER 26--BROAD RIVER BASIN--VOL. I.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Eater and Air Resources.
For primary bibliographic entry see Field 06B.
W74-01858

A CONSERVATION ELEMENT FOR THE SACRAMENTO GENERAL PLAN.
Sacramento City Planning Commission, Calif.
For primary bibliographic entry see Field 06G.
W74-01864

WATER QUALITY AND PUBLIC OPINION.
Gallup Poll, Princeton, N.J.
For primary bibliographic entry see Field 06B.

W74-01867

INTERNATIONAL WATER QUALITY LAW,
New Mexico Univ., Albuquerque. School of Law.
A. E. Utton.
National Resources Journal, Vol 13, No 2, p 282-314, April, 1973.

Descriptors: *International law, *Water quality control, *Drainage basins, Pollution, International Joint Commission.
Identifiers: Helsinki Rules, *Equitable utilization, *International drainage basin development.

The formulation of the principles of international law of drainage basins is described. The Harmon Doctrine of absolute territorial sovereignty was only briefly followed. This principle was replaced by the concept of sic utere tuo ut alienum non laedus (so use your property as not to injure your neighbor), and its corollary, limited territorial sovereignty. Following this concept, a riparian would be required to use its part of an international basin so as not to injure its coriparians in any way. This then was refined to the 'fair share' concept of equitable utilization. Benefits gained by use by one nation would be balanced against the cost or damage incurred by other coriparians. The Helsinki Rules of the Uses of the Water of International Rivers, the most definitive expression of international law of rivers, incorporates this principle of equitable utilization. Water quality obligations are articulated in Article X. The weakness of the Helsinki Rules lies in the lack of an administrative process to apply them. Recognizing this, a hierarchical 2-tier approach, where an international commission acts as a catalyst by initiating studies and formulating policy recommendations and disseminating these to cobasin states for adoption and execution, is suggested. Also suggested, but acknowledged somewhat utopian, would be the development of a basin as a unit, without regard to national boundaries according to either the principles of equitable utilization or optimum utilization. (Hoffman-North Carolina)
W74-01869

COALESCING PLATES AND PACKS FOR OIL WATER SEPARATION IN VARIOUS SHIPBOARD APPLICATIONS,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
J. G. Merryman, and E. R. Osterstock.
Available from NTIS, Springfield, Va 22151 AD-758 319; Price $6.00 printed copy; $1.45 microfiche. Final Contract Report (724305.2/6) to US Coast Guard, January 1973. 180 p, 53 fig, 8 tab. Contract DOT-CG-24290A.

Descriptors: *Oily water, *Separation techniques, *Ships, Methodology, Electrophoresis, Flow rates, Velocity, Temperature, Viscosity, Sludge, Emulsions, Oil spills, Water pollution sources, Data collections, Reviews, Test procedures, Evaluation.
Identifiers: *Oil-water separation methods.

Findings of an evaluation of coalescing plates and packs for oil-water separation in various shipboard applications are documented. Basic parameters of the system were investigated to obtain saturation of limitation trends. There are nine subsections covering separator length and angle, oil concentration, flow velocity, oil type, temperature, emulsification, sludge and solids, ship motions, and electrophoresis. Each of these subsections describes the test objective, how the test was conducted and a discussion/interpretation of the data obtained. (Woodard-USGS)
W74-01882

SUMMARIES OF FOREIGN GOVERNMENT ENVIRONMENTAL REPORTS.
Environmental Protection Agency, Washington, D.C. Library Systems Branch.
Available from NTIS, Springfield, Va 22151, PB-218 839 Price $3.00 printed copy; $1.45 microfiche. Foreign Documents Announcements, No 1, September 1972. 18 p, 31 ref.

Descriptors: *Bibliographies, *Environmental control, *Foreign countries, *Publications, Water pollution sources, Air pollution, Industrial wastes, Municipal wastes, Domestic wastes, Water quality control, Water quality standards, *Water pollution control, Pollutant identification, Chemical analysis, Pollution abatement, Documentation, Abstracts, Information retrieval, Foreign projects, Foreign research.
Identifiers: *Environmental reports, Foreign governments.

Under a series of documents exchange agreements with environmental agencies in other countries, the U.S. Environmental Protection Agency (EPA) is building a collection of environmental reports issued by foreign governments and international organizations. This annotated bibliography is the first in a series of announcements of foreign documents received. A computerized search system is being developed which will allow future retrieval of these summaries by country, subject area, and type of document. Ultimately, EPA plans to assemble a major collection of foreign government environments documents and to develop several approaches to the dissemination of this information to EPA staff. (Woodard-USGS)
W74-01886

CONTROL OF FOULING OF REVERSE OSMOSIS MEMBRANES WHEN OPERATING ON POLLUTED SURFACE WATERS,
Gulf Environmental Systems Co., San Diego, Calif.
For primary bibliographic entry see Field 03A.
W74-01908

OYSTER DRILL (OCINEBRA JAPONICA) CONTROL,
Washington State Dept. of Fisheries, Olympia.
J. Chambers, M. Fraidenburg, and T. A. Mecklenburg.
Available from NTIS, Springfield, Va 22152, COM-72-11324, Price $3.00 printed copy, $1.45 microfiche. Washington Department of Fisheries Completion Report to NOAA, National Marine Fisheries Service for the period May 1967-June 1971, March 1972. 70 p.

Descriptors: *Fisheries, *Pest control, *Shellfish, *Oysters, *Washington, Worms, Testing procedures, Barriers, Attractants, Chemicals, Reviews, Evaluation, Water quality control, Data collections.
Identifiers: *Japanese oyster drill (Ocinebra japonica).

The Japanese oyster drill is one of the most destructive oyster predators in the State of Washington. Attempts to find means of controlling the pest by attractants, barriers, and chemicals are described. Attractants produced little or no sustained results. Barriers of chemically impregnated grease were effective up to 5 months in the field, but required periodic cleaning. The chemicals tested did not demonstrate a drill-specific toxicant. Egg capsules were destroyed by a 50% dilution of sulfuric acid and water. (See also W74-01918 and W74-01919) (Woodard-USGS)
W74-01917

FLUOROPHENE, A POSSIBLE CONTROL OF JAPANESE OYSTER DRILLS ON OYSTER GROUNDS,
Washington State Dept. of Fisheries, Olympia.
J. Chambers, M. Fraidenburg, and W. Hoffman.
In: Oyster Drill (Ocinebra Japonica) Control, Washington Department of Fisheries Preliminary Report to NOAA, National Marine Fisheries Service, July 1971, p 12-35. 9 tab, 2 ref. NOAA Contract 14-17-0001-2309.

Descriptors: *Fisheries, *Pest control, *Shellfish, *Oysters, *Washington, Testing procedures, Chemicals, Worms, Water quality control, Evaluation, Data collections.
Identifiers: *Japanese oyster drill (Ocinebra japonica).

Fluorophene, which has proven lethal to Japanese oyster drills at 250 ppm in the laboratory and live-box field tests, was applied at the rate of 58 lb/acre to two 1,600 sq ft plots in an oyster dike during low tide. The mid-July treatment produced 88.3% mortality among the 67% recovered marked drills, with 96.6% of the deaths occuring in 15 days. Treatment of the second plot, in mid-August, occurred at the onset of fall spawning, and resulted in 12.4% mortality of the 46.7% of the treated drills recovered. A pronounced movement of drills occurred with most of the recoveries from outside the plot and the major movement toward the upper dike. Water currents and metabolites from ripening drills in the upper dike and the dike wall are believed to have influenced the direction of movement. The low recovery and mortality rates can be attributed to spawning activity. No recently dead oysters, clams, mussels, or slipper shells were found in the samples taken from the plots and no significant kills were found among the heavy populations of shore crabs in the dike. No dead were found among the 42% or marked drills recovered from the control for the Plot 2. (See also W74-01917) (Woodard-USGS)
W74-01918

OYSTER DRILL INVESTIGATIONS,
Washington State Dept. of Fisheries, Olympia.
J. Chambers, M. Fraidenburg, T. A. Mecklenburg, and W. Hoffman.
In: Oyster Drill (Ocinebra Japonica) Control, Washington Department of Fisheries Completion Report to NOAA, National Marine Fisheries Service, March 1972, p 36-54. 11 tab, 7 ref. NOAA 14-17-0001-2309.

Descriptors: *Fisheries, *Pest control, *Oysters, *Shellfish, *Washington, Worms, Testing procedures, Barriers, Attractants, Chemicals, Data collection, Reviews, Evaluation, Water quality contol.
Identifiers: *Japanese oyster drill (Ocinebra japonica).

In the state of Washington, three approaches to controlling Japanese oyster drills (attractants, barriers, and chemicals) failed to yield a satisfactory acceptable control. Chemical controls are possible but have so far not been found practical or acceptable. Chemicals tested that killed drills at relatively low concentrations were highly lethal to other marine organisms. Fluorophene, the chemical that holds the most promise among those tested is expensive, practically insoluble in seawater, and requires a relatively high concentration to kill drills. However, the use of a 50% dilution of sulfuric acid in water could facilitate the destruction of egg capsules on dry surfaces or by immersing capsules picked from dike walls and shells. (See also W74-01917) (Woodard-USGS)
W74-01919

WATER QUALITY AND WASTE ASSIMILATIVE CAPACITY OF THE PEARL RIVER BELOW BOGALUSA, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 05B.
W74-01922

ANALYSIS OF COAL REFUSE DAM FAILURE, MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA--VOLUME 2, APPENDICES.
Wahler (W.A.) and Associates, Palo Alto, Calif.
For primary bibliographic entry see Field 08A.
W74-01939

BASIC DIRECTIONS OF SCIENTIFIC INVESTIGATIONS IN THE PROTECTION OF SURFACE WATERS FROM POLLUTION (OKHRANA POVERKHNOSTNYKH VOD OT ZAGRYAZNENIYA (OSNOVNYYE NAPRAVLENIYA NAUCHNYKH ISSLEDOVANIY)),
Akademiya Nauk SSSR, Moscow, Institut Vodnykh Problem.
For primary bibliographic entry see Field 05B.
W74-01967

SCIENTIFIC PRINCIPLES OF WATER LEGISLATION (NAUCHNYYE OSNOVY VODNOGO ZAKONODATEL'STVA),
For primary bibliographic entry see Field 06E.
W74-01968

USE AND CONSERVATION OF WATER RESOURCES IN THE UKRAINE (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV V UKRAINSKOY SSR),
For primary bibliographic entry see Field 05D.
W74-01971

SOME NATURAL PHYSICAL PROCESSES AFFECTING THE RECOVERY OF THE GREAT LAKES,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 05B.
W74-01974

WATER POLLUTION CONTROL ACROSS THE NATION,
C. Lewicke.
Environmental Science and Technology, Vol 7, No 9 p 786-792, September, 1973. 1 fig, 1 tab.

Descriptors: *Water pollution, *Water quality control, *Comprehensive planning, Financing, Coordination, Administration, Planning, State governments.
Identifiers: *Basin planning, State-Federal relations.

A survey is presented of complaints by state environmental quality control officials against the Federal Water Pollution Control Act Amendments of 1972. Half the states responded in some way to the inquiries. Serious hindrances to clean water in the states included insufficient funding, lack of Federal direction on the 1972 amendments, lack of manpower, nonpoint source pollution, high costs of waste collection and treatment in small communities, basin planning problems, and excessive paper work. Other serious hindrances were the inability of the federal government to agree on tradeoffs between increased federal subsidies and their inflationary effects on the economy, lack of state land-use control, problems in small states of establishing a clear-cut water pollution control program, lack of effective data management systems, and the philosophy of treating symptoms of a problem rather that the problem itself. States view basin planning requirements as onerous. Degrees of interstate cooperation to achieve water quality are surveyed. The status of water quality monitoring programs is considered. Specific water pollution problems in 19 states are listed. State provisions for wetland and coastal zone management are sketchily summarized. Officials of some states believe the goals for clean water in the 1972 amendments are realistic, while others believe they are achievable only in part. (Stein-North Carolina)
W74-01975

THE USE OF ARTIFICIAL POOLS IN ASSESSING POPULATIONS OF THE MOSQUITO CULEX RESTUANS THEOBALD,
Department of Agriculture, Belleville (Ontario). Research Inst.
M. G. Maw, and G. K. Bracken.
Proc Entomol Soc Ont. 102 p, 78-83. 1971 (1972). Illus.
Identifiers: *Artificial pools, Assessment, *Canada (Ontario), Capric acid, Culex-pipiens, Culex-restuans, Density, *Mosquito populations, *Pseudomonadaceae, Bacteria.

Artificial pools containing water borne bacteria of the family Pseudomonadaceae and treated with capric acid and NH4NO3 are attractive oviposition sites for 2 of the Ontario, Canada species of Culex mosquitoes (C. pipiens and, particularly C. restuans). Large (1 m2) pools collect more rafts than small (0.09 m2) pools and are slightly more efficient at low population densities. However, the smaller pools are as effective as the large for monitoring Cultex populations for the bulk of the season and are easier to install, maintain and service. Location of the pools (low damp areas along a stream course being best) is important if they are to optimal indications of population density.--Copyright 1973, Biological Abstracts, Inc.
W74-01987

SUCTION OIL DECANTER,
Cities Service Oil Co., Tulsa, Okla. (Assignee).
E. A. Bell, and T. F. Padden.
U. S. Patent No. 3,760,944, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1291, September 25, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Equipment, Water pollution control, Water quality control.
Identifiers: *Decanting.

An apparatus for the removal of an oil slick from a body of water comprises a covered housing adapted to be positioned on a body of water and having an opening in at least one side. Within the housing are means for drawing air along the surface of the water through the housing and means for withdrawing accumulated oil from the housing. Air is drawn through the housing by an air blower connected to an air conduit, the other end of which is connected to the top of the housing. A gate may be pivotally attached to the top of the opening in the side of the housing so as to regulate the flow of air. (Sinha-OEIS)
W74-02026

THE REMOVAL OF SURFACE LAYERS FROM LIQUIDS,
Megator Pumps and Compressors Ltd., London (England). (Assignee).
F. W. McCombie.
U. S. Patent No. 3,759,390, 3 p, 4 fig, 6 ref; Official Gazette of the United States Paetent Office, Vol 914, No 3, p 910, September 18, 1973.

Descriptors: *Patents, *Oil spills, Water pollution control, Water quality control, *Pollution abatement, *Oil pollution, Equipment, *Separation techniques.

The apparatus comprises a chamber capable of floating on a liquid. There is an inlet at the upper surface through which the surface layer can enter the interior of the chamber. An outlet defines a balancing chamber, through which liquid can be drawn upward from the lower part of the chamber to a source of suction. The outlet consists of at least one pipe leading upward from the inlet and then downward in the form of an inverted V wide enough to straddle any boom or interceptor used to contain the oil (or other unwanted liquid), the downward ends are connected to a floating manifold or elbow from which a hose connects to the source of suction, and a flotation device such that the apparatus floats with the inlets above the surface of the liquids when needed. (Sinha-OEIS)
W74-02030

FLOATING BOOM STRUCTURES,
Barracudaverken A.B., Gamleby (Sweden). (assignee).
E. J. Larsson.
U. S. Patent No. 3,757,526, 3 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 448, September 11, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water quality control, Water pollution control, *Pollution abatement, Equipment.
Identifiers: *Booms.

The boom consists of two superimposed sheets of plastic foil material which are welded together at a number of sequentially arranged points in the longitudinal direction of the boom to form rectangular closed pockets located on the upper half of the boom when in use. Each pocket contains one filing body which extends the pocket to form a buoyant body of requisite buoyancy. The filling body is constructed of corrugated cardboard. The boom is held in a vertical position when afloat in the water. (Sinha - OEIS)
W74-02036

FLOATING BARRIER FOR CIRCUMSCRIBING OIL POOLS OR LIKE REFUSE,
M. A. Belin.
U. S. Patent No. 3,739,584, 3 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 911, No 3, p 818, June 19, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Equipment, Water quality control, Water pollution control.

A floating barrier for circumscribing and trapping oil films or like refuse in harbors and other bodies of water comprises a strip of noncorrodible material such as stainless steel and a pair of buoyant floats removably fitted at intervals on opposite sides of the strap so as to support it vertically in the body of water. Junction means interconnect the floats pairwise and can be engaged through the strip. A pair of watertight stabilizing compartments is removably secured to opposite sides of an end portion of the strip and can be connected to a hauling or towing craft. (Sinha - OEIS)
W74-02037

PRELIMINARY TRIALS WITH HERBICIDES IN IRRIGATED ONIONS AT SAMARU, NIGERIA,
Institute for Agricultural Research, Zaria (Nigeria).
For primary bibliographic entry see Field 03F.
W74-02079

PESTS, CROP DAMAGE AND CONTROL PRACTICES WITH IRRIGATED COTTON IN A TROPICAL ENVIRONMENT,
Commonwealth Scientific and Industrial Research Organization, Canberra (Austrailia). Div. of Land Research.
A. G. L. Wilson, J. J. Basinski, and N. J. Thomson.
Cotton Grow Rev. Vol 49, No 4, p 308-340. 1972. Illus.
Identifiers: *Austrailia (Ord River Valley), Control, *Cotton, Crop damage, Fertilizers, Insects, Insecticides, Irrigated, Nitrogen, *Parathion, Pests, Tropical environment.

An evaluation over 2 seasons of the effects of progressive delays in commencing complete insect protection (parathion spray) on cotton crops and also of the effects of intermittent protection on yield and quality was made at Kimberley Research Station, inthe Ord river valley, Western Australia. Progressive delay in protection until 12 wk after sowing did not adversely affect yields but in the second season there was a significant yield reduction if control was delayed until 16 wk. However, this reduction did not occur with an equally

delayed treatment to which N fertilizer application was made shortly before commencement of protection, and a beneficial effect was noted with the longest delayed protection treatment with late N application in the first season. Yields were reduced between 20 and 40% in the intermittently sprayed treatments, compared with the mean of the protected treatments. Fiber quality of the later-protected treatments where boll development was displaced into the cooler winter months was adversely affected, particularly as regards staple length and micronaire value. The overall agronomic implication of delays in imposing insect control on irrigated cotton crops in the Ord valley was discussed. A reduction in numbers of spray applications could be achieved by delaying protection against pests until after the wet season; staggering the date at which protection commenced would make possible the more economic use of labor and machinery.--Copyright 1973, Biological Abstracts, Inc.
W74-02093

ENVIRONMENTAL SCIENCE TECHNOLOGY INFORMATION RESOURCES,
For primary bibliographic entry see Field 06G.
W74-02100

PAST AND CURRENT RESEARCH ON DISEASES OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.),
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 02I.
W74-02112

REGIONAL LAND USE PLAN, 1973, FOR HANCOCK, HARRISON, PEARL RIVER, JACKSON COUNTIES, MISSISSIPPI.
Gulf Regional Planning Commission, Gulfport, Miss.
For primary bibliographic entry see Field 04A.
W74-02120

MUNCIE INDIANA'S 'TOTAL' LOCAL WATER QUALITY PROGRAM,
Muncie Sanitary District, Ind. Water Quality Div.
For primary bibliographic entry see Field 05B.
W74-02132

MUNCIE SANITARY DISTRICT, 1972, 8TH ANNUAL REPORT.
Muncie Sanitary District, Ind.
For primary bibliographic entry see Field 05D.
W74-02133

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS-VOLUME VII: CONFLICT AND CHOICE: MULTIOBJECTIVE WATER--RESOURCES PLANNING,
Cornell Univ., Ithaca, N.Y.
D. A. Haith, and D. P. Loucks.
Available from the National Technical Information Service as PB-225 830, $3.75 in paper copy; $1.45 in microfiche. New York Water Resources and Marine Sciences Center, Ithaca, Technical Report 68, 1973. 90 p, 11 fig, 11 tab, 46 ref. OWRR C-3101 (no 3684) (3).

Descriptors: *Decision making, *Optimization, Comparative benefits, Efficiencies, *Multiple purpose, *Planning, Political constraints, Project feasibility, Systems analysis, *Simulation analysis, *Mathematical models, *Urbanization.

The study deals with the application of mathematical modelling to multi-objective water resources planning. Such planning is seen as the selection and quantification of the various planning objectives, the formulation of technologically feasible plans which are efficient in the Pareto sense and finally screening of plans for political feasibility. Aspects of political decision-making which are relevant to multiobjective planning are reviewed, as are current Federal guidelines for multi-objective planning and techniques for quantifying water-resource planning objectives. A general framework for the application of mathematical models to multiobjective planning is developed. Optimization and simulation models are seen as useful in two planning stages. In the plan formulation stage, models can be used to generate efficient plans incorporating a range of possible tradeoffs among objectives. In the plan selection stage, models which require decision-maker interaction and/or subjective data from the planner may be used to screen plans for political feasibility. Examples and case studies of both types of applications are presented.
W74-01784

ECONOMICS OF MARINE RESOURCES DECISION MODEL,
California Univ., Santa Barbara. Marine Sciences Inst.
J. J. Sullivan.
In: Final Report 'Multiple Uses of Santa Barbara Channel Marine Resources,' p 30-60, 1971. 7 fig. NSF GH 95.

Descriptors: *Decision making, *Model studies, *Economic impact, *Coasts, Land use, Population, Water pollution, Air pollution, Costs, Cost-benefit analysis, Environment, Sewage disposal, Evaluation, Planning, *California.
Identifiers: *Santa Barbara (Calif), *Coastal zone development, Sea coast planning, Marine resources.

The overall purposes of the interdisciplinary project is the development of an environmental decision submodel, which, in combination with the results of several other subprojects, is intended to aid in the formulation of a Seacoast General Plan. The current procedure for fulfilling this purpose consists of two steps: (1) continued research to identify and measure variables which could be used to determine the economic impacts of marine resource use as well as the specification and programming of a decision model, and (2) use of the decision model to measure impacts of alternative decisions. Additionally, the completed model could be used to train people to make environmentally and economically sound decisions concerning marine resources. Major accomplishments as of September 1, 1971 include a cost computation model, a preliminary marine resources model, an extensive enumeration of the impacts and costs of alternative environmental resource uses, and a book-length manuscript specifying variables relevant to the model. A seacoast planning project has attempted to formulate a plan and decision procedure whereby university research and county level seacoast planning could be coordinated. (Weaver-Wisconsin)
W74-01837

REPORT ON THE HARVARD PROGRAM OF RESEARCH IN WATER RESOURCES DEVELOPMENT,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 06B.
W74-01846

A METHODOLOGY FOR DETERMINING OPTIMAL LONGITUDINAL SPACING OF EFFLUENT DISCHARGES INTO A RIVER,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
For primary bibliographic entry see Field 05B.
W74-01928

MULTI-TIME PERIOD FACILITIES LOCATION PROBLEMS: A HEURISTIC ALGORITHM WITH APPLICATION TO WASTE WATER TREATMENT SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
For primary bibliographic entry see Field 05D.
W74-01929

OPTIMAL ALLOCATION OF WATER RESOURCES IN UTAH,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 04A.
W74-02117

6B. Evaluation Process

THE ECONOMIC IMPACT OF BEAVER LAKE RESERVOIR: A COST BENEFIT STUDY,
Arkansas Univ., Fayetteville. Dept. of Economics.
D. Market.
Available from National Technical Information Service as PB-225 472/0 $5.50 in paper copy; $1.45 in microfiche. Arkansas Water Resources Research Center Publication No. 14, 1973. 217 p, 41 fig, 72 tab, 33 ref. OWRR B-024-ARK (1), 14-31-0001-3558.

Descriptors: *Economic impact, Recreation demand, Economic efficiency, Growth, Income, *Arkansas, *Cost-benefit analysis, *Net income, Industries, *Post impoundment.
Identifiers: *Beaver Lake Reservoir (Ark), Recreational benefits, Personal income.

This study was undertaken to determine the impact of Beaver Lake Reservoir on four contiguous Arkansas counties. Analysis of economic data indicated that lake related personal income in the area has, since the project was completed, been about 2.5% higher than it would have been had the lake not been constructed. The greatest impact has been associated with the counties having the largest share of the shore line. In the aggregate, however, the most significant cause of economic growth in the area has been associated with growth of manufacturing employment. Also the relative economic position of each of the counties remained virtually unchanged since the project was undertaken. From the viewpoint of economic efficiency, revenues to the Federal Government attributable to the project have been sufficient to result in the project having a net annual yield of 2.8 percent even without considering the 'free' recreational benefits of the lake.
W74-01652

ARID URBAN WATER MANAGEMENT: SOME ECONOMIC, INSTITUTIONAL AND PHYSICAL ASPECTS,
Nevada Univ., Reno. Desert Research Inst.; and Nevada Univ., Reno. Center for Water Resources Research.
G. F. Cochran, and W. C. Wilson.
Available from the NTIS as PB-225 511/5 $3.50 in paper copy, $1.45 in microfiche. Technical Report Series H-W, Hydrology and Water Resources Publication No. 11, November 1971. 62 p, 20 fig, 26 tab, 25 ref, 2 append. OWRR C-1872 (No 3173) (1).

Descriptors: *Conjunctive use, *Water rates, *Dynamic programming, *Water policy, Groundwater mining, Safe yield, Pricing, Political aspects, Institutions, *Nevada, *Colorado River, *Water management (Applied), Land use, Arid lands.
Identifiers: *Las Vegas Valley (Nev).

This is the second report on a study entitled, 'Research and Analysis to Plan, Develop and Manage a Ground and Surface Water Supply.' The study area is the Las Vegas Valley in southern Nevada which has a ground- and surface-water

supply system. Possible future population growth and water requirements for the area are examined. Water use projections are based on type of use and area of use predicted on land use plans and economic relationships. Area water pricing schemes are examined to disclose possible inequities in burden carried by various used groups to amortize water facilities and pay operating costs. The pricing mechanism is examined as a means of controlling water usage and providing equitable cost distribution. Water related institutions extant are examined in light of their apparent ability to exercise optimal or near optimal control over the water resources systems. An alternative institution is proposed which would enhance control and optimal use of available resources. Models of the various physical components of conjunctive water resource system are presented and are discussed in relationship to current institutional controls. It is demonstrated that current contractural agreements are neither optimal in terms of management of the physical system nor completely equitable in the distribution of costs of system operation.
W74-01662

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS-VOLUME VII: CONFLICT AND CHOICE: MULTIOBJECTIVE WATER--RESOURCES PLANNING,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 06A.
W74-01784

HAWAII'S SYSTEM OF WATER RIGHTS: AN ECONOMIC EVALUATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 06E.
W74-01785

RESOURCE ALLOCATION IN A NON-CONVEX ECONOMY,
Purdue Univ., Lafayette, Ind.
J. C. Moore, A. B. Whinston, and J. S. Wu.
Review of Economic Studies, Vol 39, No 19, p 303-323, 1972. 6 fig, 27 ref.

Descriptors: *Economic efficiency, *Resource allocation, Theoretical analysis, Welfare, Mathematical models, Model studies.
Identifiers: *Non-convex production sets, *Pareto optimality, Competitive equilibrium.

In order to develop a more realistic model of production the occurrence of increasing returns and indivisibilities in production technology must be introduced by relaxing the assumption of convexity for production sets. Issues in resource allocation raised by this more realistic model are discussed. Principal among these issues is the relationship between Pareto optimality and competitive equilibria. Although this relationship is well defined for assumptions of convexity, the objective is to derive the necessary and sufficient conditions characterizing the coincidence of a Pareto optimal allocation and a competitive equilibrium. Based upon an Arrow-Debreu model of a competitive economy, conditions for Pareto optimality, and competitive and valuation equilibrium are defined first for assumptions of convex production sets. Next, a non-convex production set (increasing returns) is assumed and two examples are used to illustrate that the relationship of a Pareto optimal allocation and a valuation (or competitive) equilibrium is dependent upon the initial resource endowment. This point is reiterated more precisely with the aid of a welfare resource epigraph of economy. (Weaver-Wisconsin)
W74-01829

EVALUATING WATER BASED RECREATION FACILITIES AND AREAS,
North Carolina State Univ., Raleigh. Dept. of Recreation and Park Administration.
C. C. Stott.
National Recreation and Park Association, Washington, D.C. Bulletin No 70, 1967. 48 p.

Descriptors: *Recreation facilities, *Evaluation, *Water sports, Water quality, Standards, Access routes, Road design, Operation and maintenance, Aesthetics, *Swimming, *Boating, Water utilization.
Identifiers: Parking, *Picnic areas.

Criteria to aid in the evaluation of the quality of current water based recreation facilities are presented along with standards for evaluation of their present and future operations and developments. Consideration is limited to day use facilities with special emphasis on site selection, design and construction, and maintenance of swimming, picnicking, and boating facilities. Thus, both function and aesthetic characteristics of the facilities may be evaluated. Evaluation of any particular project is accomplished by answering an appropriate set of questions included and utilizing an evaluation score sheet found in the appendix. This technique may be of use to park and recreation administrators, private developers, or park and recreation planners. (Weaver-Wisconsin)
W74-01831

FLOOD MITIGATION VERSUS POPLAR GROWING AS ALTERNATIVE PUBLIC INVESTMENTS: A CASE STUDY,
V. Ramasamy, and J. A. Sinden.
Journal of the Australian Institute of Agricultural Science, p 182-184, September 1972. 2 tab, 5 ref.

Descriptors: *Economics, *Flood control, *Dairy industry, *Lumber, Income, Cost-benefit ratios, Financing, *Australia, Investment.
Identifiers: *Poplars.

Alternative public investments aimed at improving low dairy farm incomes in New South Wales, Australia were studied. Net present value and benefit-cost criteria were employed to evaluate the efficiency of three types of land use: dairying, dairying with flood mitigation investments, or with investments in poplar growing. Returns to dairying were calculated for prevailing world market prices and subsidized prices. In addition, two standards of management were considered. Poplar investment on a 18-year rotation with one acre being felled per year was assumed. Both basic and optimistic yields were considered along with returns from crops grown between the trees during the first two years and livestock grazing for the next nine years. For flood mitigation levee banks and spillways would be constructed. Results indicate that profitability of average poplar production is greater than that of efficiently managed farms with flood mitigation investments even if pessimistic prices and the lowest poplar yields are assumed. However, benefit-cost ratios show flood mitigation preferable by 5% in this latter case. (Weaver-Wisconsin)
W74-01832

POLLUTION ABATEMENT AND UNEMPLOYMENT. A METHODOLOGICAL STUDY,
Institute of Public Administration, Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-01835

ECONOMICS OF MARINE RESOURCES DECISION MODEL,
California Univ., Santa Barbara. Marine Sciences Inst.
For primary bibliographic entry see Field 06A.
W74-01837

COST BENEFIT STUDIES OF IRRIGATION PROJECTS AND SUGGESTIONS FOR THEIR IMPROVEMENT,
Central Water and Power Commission, New Dehli (India).
For primary bibliographic entry see Field 03F.
W74-01842

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS. PART III.
Booz-Allen Public Administration Services, Inc., Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-01844

STANDARDS AND CRITERIA FOR FORMULATING AND EVALUATING FEDERAL WATER RESOURCES DEVELOPMENTS,
Bureau of the Budget, Washington, D.C.
M. M. Hufschmidt, J. Krutilla, J. Margolis, and S. A. Marglin.
In: U S Congress Joint Economic Committee. Hearings before the Subcommittee on Economy in Government. 91st Cong, 1st Session. May 12 and 14, 1969. Appendix I, p 135-212, (1969). 1 tab.

Descriptors: Water resources, *Water resources development, *Planning, Discount rates, Interest rates, Risks, Alternative costs, Recreation, Financing, Investment, *Standards, *Evaluation, Model studies.
Identifiers: *Public investment model, Secondary benefits, Investment decision process, *Criteria.

Specific areas related to the adoption of standards and criteria for formulating and evaluating Federal water resource developments are discussed including: (1) the basic framework for water resource development, (2) the interest or discount rate, (3) secondary benefits, (4) risk and uncertainty, (5) use of alternative costs in formulating and evaluating hydropower projects, (6) recreation and fish and wildlife values, (7) financial policy, including cost sharing and cost allocations, and (8) the investment decision process. Standards and criteria were viewed as a part of a larger investment decision process for Federal public works. Conclusions and recommendations suggested that an interim set of revised standards and criteria should be issued, followed by a more detailed set in the context of the overall investment-decision process and framed in terms of all relevant objectives of public policy. The interest or discount rate to be used in economic analysis should reflect the Administration's social rate of time discount, to be used in conjunction with a cutoff benefit-cost ratio. Income gains and losses from external economies and diseconomies should be included, and benefits for objectives other than national income must be identified. Cost offsets should be used in plan formulation in situations of secular unemployment. Adjustments for risk in individual projects should be reflected in benefit estimates. The period of analyses should be the lesser of the economic life of the project features or 100 years. Where there are specific public income redistribution objectives at hand, cost-sharing and repayment policy should be related to these. Conclusions about the investment decision process are also offered. (Edwards-North Carolina)
W74-01845

REPORT ON THE HARVARD PROGRAM OF RESEARCH IN WATER RESOURCES DEVELOPMENT,
Harvard Univ., Cambridge, Mass.
A. Maass, and M. M. Hufschmidt.
In: Resources Development: Frontiers for Research; papers of the Western Resources Conference, 1959, F. S. Pollak editor. University of Colorado Press, Boulder, p 133-179, 1960. 10 fig.

Descriptors: Water resources, Methodology, *Design criteria, Design, *Simulation analysis, *Mathematical models, *Idaho, Multiple purpose, *Planning, Optimization.
Identifiers: *Harvard Water Resources Program, System design, *Clearwater River (Idaho).

Methodology developed in the Harvard Water Resources Program for the planning and design of multi-unit, multi-purpose water resource systems is presented. Objectives were to allow the simultaneous consideration of a large number of alternative system designs, to effect improvements in planning river systems so as to 'marry' engineering and economics, and to be adaptable to any reasonable economic objective and institutional constraints. Potential objectives such as economic efficiency, employment, income redistribution, economic growth, and other intangible ones, are discussed with respect to their conversion into objective functions or design criterion. The optimal system design will be that combination of system units and outputs for which the net benefits are maximized subject to whatever constraints are imposed. The application of formal conditions necessary to achieve this design is explained. Also described are efforts at simulation of a river system--with hydrology based on the Clearwater River in Idaho--on a digital computer. Input variables are system units and target outputs. The results are given as gross and net benefits expressed in dollars. Limitations of simulation are discussed. The utility of mathematical models for deriving optimum size of units, optimal output, and an optimal operating procedure are explored in detail. Political decisions about the objective (s) to be maximized are important. (Edwards-North Carolina)
W74-01846

THE NATIONAL WATER COMMISSION REPORT: A REVIEW,
Arizona Univ., Tuscon. Inst. of Government Research.
For primary bibliographic entry see Field 06E.
W74-01853

NORTH CAROLINA WATER PLAN--PROGRESS REPORT, CHAPTER 26--BROAD RIVER BASIN--VOL. I.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Eater and Air Resources.

Draft Report May, 1973. 132 p, 19 fig, 38 tab, 75 ref, 5 append. Supported in part by the Water Resources Council.

Descriptors: *River basin development, *Resources, Pollutants, Water quality control, Water quality standards, Precipitation (Atmospheric), Treatment facilities, Hydrology, *North Carolina.
Identifiers: *Broad River Basin (N.C.).

The general physical nature of the Basin, plus projections of population, employment, income, industry, and agriculture are presented. Some major conclusions are: the Basin receives abundant precipitation (averaging 52 inches) evenly distributed over the year; most streams have their headwaters in the Appalachian Mountains where runoff averages 1.6 cfsm; ground water can be tapped in most parts of the Basin, with the highest yielding wells in the eastern sector. Nine categories of water use are detailed. The largest use during 1971 was for steam electric power generation, with an average use of 280 mgd for cooling purposes. Major water pollution sources are described. Specific point sources of pollution are given in an appendix. Streams and rivers are near saturation of dissolved oxygen, slightly acid by nature, and of very low alkalinity. Extensive pollution is found in Cleghorn Creek, Vaughn Creek, Brushy Creek, and Buffalo Creek, as well as other streams. The criteria used to evaluate water quality are: (1) documented violations of state water quality standards, (2) occurrences of water pollution which have prevented use of water, and (3) existence of large amounts of untreated or uncontrolled wastes entering the waterways of the Basin. Water control and power structures are described as small-scaled. The largest reservoir or lake has a surface area of 900 acres. Public and industrial water supply facilities are inventoried. (Hoffman-North Carolina)
W74-01858

NORTH CAROLINA WATER PLAN-PROGRESS REPORT: CHAPTER 44, THE APPALACHIAN REGION IN NORTH CAROLINA.
North Carolina State Dept. of Water and Air Resources, Raleigh.

Draft Report August, 1970. 80 p, 13 plates, 16 tab, 63 ref, 8 append. Supported in part by Water Resources Council.

Descriptors: *Planning, Water resources development, *North Carolina, *Federal project policy, *Appalachian Mountain Region, Coordination, *Regional development.
Identifiers: *Federal-state water development coordination, Appalachian redevelopment act.

The Appalachian Region contains 29 counties located in the Blue Ridge and Piedmont physiographic regions, drained by the Kanawha, Yadkin, Santee, and Tennessee River systems. Pertinent sections of the Appalachian Regional Development Act of 1965 are reproduced. Secion 203 (a), which provides for a program of land stabilization, conservation, and erosion control, and Section 212 (a), which provides supplemental grants for waste treatment systems, were utilized for stream flow quality improvement and reducing stream pollution. Summaries of the program by county and by practice are included. State participation in the Appalachian Water Study is outlined, including statements and conclusions generated by North Carolina concerning the problems and priorities of water resources in the Appalachian Region Counties. Development of the Upper French Broad Valley was the paramount concern. Recommendations of the Federal Report concerning North Carolina are delineated by project, status, and purpose. Tabular information relating to costs, benefits, allocation between purposes, project financial costs, apportioned construction costs, and apportioned project operations costs are included for the Clinchfield, Roaring River, and Upper French Broad Projects, which were recommended for early action. The Reddies River Project, specified as a prerequisite project for the Roaring Rivers Project, is included as an early construction priority. Statements of intent by North Carolina concerning these projects are summarized. Detailed cooperative planning, including both interstate and intrastate efforts, is mandatory. (Hoffman-North Carolina)
W74-01859

NORTH CAROLINA WATER PLAN-PROGRESS REPORT CHAPTER 25, THE CONCEPT OF BASIN AND REGION REPORTS IN THE NORTH CAROLINA WATER PLAN.
North Carolina State Dept. of Water and Air Resources, Raleigh.

Draft Report May, 1971. 117 p, 47 plates, 6 tab, 15 ref, 11 append. Supported in part by Water Resources Council.

Descriptors: *River basins, *Planning, *North Carolina, Federal project policy, Piedmont, Watersheds, *Appalachian mountain region, *Regional development.
Identifiers: *Planning units, Multi-county planning regions.

Federal water resource development plans are usually prepared around partial or complete river basin units. In the North Carolina area, these include the Ohio River Basin, the Tennessee Valley Region, the South-Atlantic Gulf Region, the Appalachian Region, and the Coastal Plains Region. Although downstream effects verify the desirability of considering river basins as units, appropriate economic and political boundaries are seldom congruent. North Carolina delineates not only river basin areas but also multi-county planning regions. These are identified by various geographic and hydrolic considerations necessary for preparation of the North Carolina Water Plan and are detailed by individual descriptions and maps. In considering the choice of regions (basin or non-basin) for the North Carolina Water Plan, weight was given to: (1) the existence of 'river basins' with well understood boundaries which by logic or custom have become accepted, and for which data have been accumulated, (2) the existence of river basins or non-river basin regions which are given special attention through Federal agencies, and (3) the existence of special state-sponsored planning areas or of relatively small intra-state Federal study areas which have generated interest. (Hoffman-North Carolina)
W74-01860

NORTH CAROLINA WATER PLAN PROGRESS DURING F.Y. 1973.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.

July, 1973. 25 p, 2 append. Supported by Water Resources Council.

Descriptors: *Planning, *Administration, *Budgeting, Data collections, Data storage and retrieval, Personnel, Programs, Cooperation, Publications, North Carolina.
Identifiers: *North Carolina Water Plan.

This semi-annual report to the Water Resources Council under the Water Resources Planning Act includes a summary of the activities of the Planning Division of the Office of Water and Air Resources during fiscal year 1973, a review and analysis of these activities, a work plan for fiscal year 1974, and several appendices covering organization, budgets, salaries, publications, meetings, and the status of the North Carolina Water Plan. Activities of the Planning Division are divided into four basic categories: (1) administration, under which the type and utilization of personnel is discussed along with their continuing education experiences; (2) planning data, which include additions to the Water Resources Information Center Library, the availability and use of computer programs to collect and use data on hydrologic parameters, water quality, and low flow for example, and the status of the U.S. Geological Survey cooperative data collection program; (3) planning liaison, particularly with federal studies and agencies such as the Corps of Engineers, the Soil Conservation Service, and the Environmental Protection Agency; and (4) the North Carolina Water Plan, for which Chapter 5 on intergovernmental relationships and Chapter 26 on the Broad River Basin were completed and several other chapters were nearing completion. Supporting data and information appears in appendices. (Elfers-North Carolina)
W74-01861

THE ADAPTED PUBLIC INVESTMENT MODEL WITH PARTICULAR REFERENCE TO THE WATER RESOURCE SECTOR IN METROPOLITAN DEVELOPMENT,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 06C.
W74-01862

WATER QUALITY AND PUBLIC OPINION.
Gallup Poll, Princeton, N.J.

Journal of the American Water Works Association, Vol 65, No 8, p 513-519, August, 1973. 2 fig, 13 tab.

Descriptors: *Water quality, *Potable water, Water reuse, Water supply, Water pollution, *Attitudes.
Identifiers: *Public opinion, Polls.

A report of a survey conducted for the American Water Works Association discusses attitudes of consumers toward water supplies and pollution. Sixty-eight per cent of U.S. households obtain water from a government system, 20% from a well or spring, and 6% are serviced by a private water company. Seventy per cent of Americans are satisfied with the quality of their water, including taste, smell, and color. The most frequent complaint is that it 'tastes bad,' according to 14% of those surveyed. Southerners expressed the most satisfaction with their water, women and blacks the least. The facts that women are principal users of water and that many blacks live in substandard housing are offered as explanations of these findings. Only 10% of respondents said they were occasionally restricted in the amounts of water they could use. Meters are used in 83% of homes served by public sources, but only 73% of homes served by private sources. Satisfactory ratings for services of public and private water sources were comparable in propertion, although private sources received more ratings of 'excellent.' Most apprehensive about potential water shortages were persons with the most education, persons living in cities, and persons drawing water from public sources. A majority of users view pollution as a current threat to drinking water. Young adults are more included to view pollution as a threat to drinking water than adults over 50. Only 38% of respondents said they would not object to drinking recycled sewage. Tables present detailed analysis of the survey. (Stein-North Carolina)
W74-01867

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, PRIORITIES FOR THE RIVERBANKS PLAN.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.

Available from the National Technical Information Service as PB-218 680 $6.00 in paper copy, $1.45 in microfiche. Prepared for Southern Tier East Regional Planning Agency, Binghamton, N.Y. Report EGNIED-72-09. September 1972. 79 p, 5 maps. HUD Project NYP-246.

Descriptors: *Recreation, *Parks, *Evaluation, Costs, Natural resources, *Regional analysis, Recreation facilities, *New York.
Identifiers: *Riverbanks, Water-related recreation, Susquehanna River, Broome-Tioga Counties (N.Y.), Criteria, Open Space.

This report, a supplement to the Riverbanks Plan formulated in the overall recreation study, is intended to implement the Riverbanks Plan by developing a more detailed and realistic set of criteria to evaluate and assign priorities to the elements of the Plan. The criteria are divided into two basic categories: desirability criteria and advisability criteria. The latter criteria are intended to add a dimension of political and economic reality to the overali ranking of the individual projects and parks. The desirability criteria include the quality of the natural features, the accessibility to population centers, the historical and archaeological value, and the susceptibility of the site to flooding. The advisability criteria include the possibility of preemption of the site for some other use, the poossibility that the site will be developed privately for recreation, acquisition costs involved, development costs for proposed use of the site, operation and maintenance costs, and the likely contribution of the potential park to the benefit of the people of the two-county region. Fifty-nine potential sites are evaluated using these criteria and the results are presented. (See also W74-01872) (Elfers - North Carolina)
W74-01871

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, RECREATION, OPEN SPACES, RIVERBANKS.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.

Available from the National Technical Information Service as PB-217 296 $11.00 in paper copy, $1.45 in microfiche. Prepared for Southern Tier East Regional Planning Agency, Binghamton, N.Y. February, 1972. 154 p, 30 fig, 8 tab, 14 maps. Report EGNIGD-72-02. NYP-246 HUD Project.

Descriptors: *Recreation, *Parks, *On-site investigations, Planning, Recreation facilities, Surveys, Maps, *Regional analysis, *New York.
Identifiers: *Open space, *Riverbanks, Susquehanna River, Broome-Tioga Counties (N.Y.), Water-related recreation.

This report on outdoor recreation is divided into two studies: one on recreation facilities and the use of available open spaces in the two county region and the other on the specific development of the extensive riverbanks of the region for recreation. The emphasis is on developing a regional recreation system, preserving open space and natural resources, and greater use of the riverbanks of the Susquehanna, Chenango, and Tioughnioga Rivers. In both studies extensive use is made of U.S. Geological Survey maps, photographs, field surveys, and on-site inspections. Twenty-four regional park sites are analyzed and given a priority for development. Three criteria used in analysis are the availability of water resources and proper physiographic features, the minimal displacement of existing development and disruption of natural processes, and accessibility from existing roads. The riverbanks plan emphasizes the use of major park or open areas connected by open space strips along the rivers. Six types of open areas are identified as possible elements of the plan: (1) conservation areas to preserve natural features and processes; (2) basic park for light recreational activity; (3) intermediate park for picnicking and games; (4) intensive use park with the construction of public facilities; (5) special facilities; and (6) strip connections largely for hiking and connecting parks. Detailed plans including cost estimates are given for selected sites which illustrate the six types. (See also W74-01871) (Elfers - North Carolina)
W74-01872

ENVIRONMENTAL POLLUTION, A SURVEY EMPHASIZING PHYSICAL AND CHEMICAL PRINCIPLES,
Iowa State Univ., Ames. Dept. of Physics.
For primary bibliographic entry see Field 05B.
W74-02002

SOCIAL GOALS AND EVALUATION OF RESOURCE COMMITMENTS,
George Washington Univ., Washington, D.C. Dept. of Public Administration.
D. D. Bracken.
Water Resources Bulletin, Vol 9, No 3, p 485-493, June 1973. 15 ref.

Descriptors: *Social values, Evaluation, *Project planning, *Social impact, Social needs, *Water resources development, *Alternative planning.
Identifiers: Water Resources Council.

The field of water resources has become increasingly aware of public demands for evaluating alternative project commitments that consider environmental and social objectives in addition to traditional economic criteria. This has led to endeavors to identify the full array of social goals in Water Resources Council Special Task Force reports as well as in research funded through the Office of Water Resources Research and other agencies. It seems appropriate, however, to consider efforts already completed or currently underway in the social science disciplines, professional fields, and national commissions not affiliated with water resource interests. This report identifies and discusses major efforts to identify social goals as input in evaluation procedures highlighted by Water Resources Council Special Task Force reports.
W74-02110

COMPONENTS OF OUTDOOR RECREATIONAL VALUES: KISSIMMEE RIVER BASIN, FLORIDA,
Florida Univ., Gainesville. Water Resources Research Center.
K. C. Gibbs, and J. R. Conner.
Southern Journal of Agricultural Economics, p 239-244, July 1973. OWRR B-007-FLA (6). 14-31-0001-3267.

Descriptors: *Water allocation (Policy), *Water values, Water utilization, *Water demand, Decision making, *Florida, *Recreation demand.
Identifiers: *Kissimmee River basin (Fla).

Procedures are presented to estimate total recreational value of water in a river basin system: the Kissimmee River Basin, Florida. Two types of recreationists utilize the Kissimmee River Basin Waters. There are recreationists actually living (either permanently or during vacations and holidays) on lakefront property, as opposed to those traveling to the area primarily to partake in recreational activities through facilities providing public access to the water. For both types of recreationists the primary water-based activities include fishing, waterskiing, boating, and swimming. Visiting recreationists also enjoy camping. Procedures used in this study include interviews with both types of recreationists in order to obtain estimates of the annual value of recreation. To obtain as much homogeneity as possible, the year was divided into the following four time periods, determined partly by the types of recreation existing in each period: (1) February - May, (2) June - September, (3) October - November, and (4) December - January. (Morgan-Florida)
W74-02113

VACATION HOME LOCATION: A MODEL FOR SIMULATING THE RESIDENTIAL DEVELOPMENT OF RURAL RECREATION AREAS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
R. J. Burby, III, T. G. Donnelly, and S. F. Weiss.
Regional Studies, Vol 6, p 421-439, 1972. 2 fig, 9 tab, 13 ref, append. OWRR B-012-NC (11). 14-01-0001-1935.

Descriptors: *Urbanization, *Community development, *Recreation, *Land Development, Reservoirs, Impoundments, Land Use, Model studies, Computer models, North Carolina, Georgia.
Identifiers: *Vacation homes, Lake Norman (NC), Lake Sidney Lanier (Geo).

Vacation home communities are becoming increasingly common on the periphery of large metropolitan areas. While these developments pose a number of serious environmental and service problems for affected local governments, existing planning methodologies have ignored the spatial structure of vacation housing. Analysis of the vacation home development process highlights factors leading to environmental deterioration and indicates the extent to which urban and vacation home location decisions are based on different lo-

cational criteria. Utilizing this information and data describing the Lake Norman, North Carolina, and Lake Sidney Lanier, Georgia, reservoir areas, a computer model for simulating urban and vacation home development patterns is presented and evaluated. The model provides planners and policy makers with a useful tool to evaluate the effects of policy alternatives on recreation area development patterns and forecast the probable location of residential growth.
W74-02115

REGIONAL LAND USE PLAN, 1973, FOR HANCOCK, HARRISON, PEARL RIVER, JACKSON COUNTIES, MISSISSIPPI.
Gulf Regional Planning Commission, Gulfport, Miss.
For primary bibliographic entry see Field 04A.
W74-02120

WATER IN MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 04A.
W74-02122

COMPREHENSIVE SEWERAGE PLAN FOR GRAND ISLAND, NEBRASKA.
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W74-02123

FLOOD PROTECTION FOR MISSOURI BOTTOMS.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 04A.
W74-02128

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

SURVEY OF THE SOUTH CAROLINA OYSTER FISHERY,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
R. C. Gracy, and W. J. Keith.
Technical Report No. 3, March 1972. 28 p, 17 fig, 4 tab, 63 ref.

Descriptors: *South Carolina, *Shellfish farming, Commercial shellfish, Oysters, Fish management, Regulation, Intertidal areas, Labor, Leases, Recreation.
Identifiers: Inefficiency, Labor shortages, Industry instability, Industry productivity.

Through an examination of the history of the current oyster industry this study reveals a declining trend in production since 1908 resulting from poor management, lack of suitable hand labor, and periodic labor shortages. Together these factors render instability, and low productivity. Poaching on private grounds is encouraged by the lack of commercial public grounds, and the absence of a licensing system which would restrict a harvester to a specific lease. A field survey of the oyster industry indicated that only one plant in South Carolina processes oysters, although the oyster supply is potentially very great. Leasing is complicated and requires inventories of intertidal areas which are often difficult to compile, however accurate records of leases, lessees, acreages and locations are nearing completion. Public oyster recreation areas are being reorganized. A 1970 feasibility study of intertidal management utilizing aerial photography indicated the method may be useful. Recommendations call for both immediate and future actions to ensure a revitalization of the industry before its decline becomes irreversible. (Weaver-Wisconsin)
W74-01830

SOME BIOLOGICAL CHARACTERISTICS OF A CHANNEL CATFISH POPULATION IN THE LOWER DES MOINES RIVER WITH AN EVALUATION OF POTENTIAL COMMERCIAL HARVEST,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
J. Mayhew.
Available from NTIS as COM-72-10808 $3.00 in paper copy, $1.45 in microfiche. Iowa Fisheries Research Technical Series No 72-2, 1972. 52 p, 9 fig, 20 tab, 3 plates, 30 ref.

Descriptors: *Fish harvest, *Evaluation, *Fisheries, *Value, *Channel catfish, *Iowa, Commercial fish, Sport fish, Fisheries, Nets, Life history studies, Standing crops, Permits, Pollutants, Public health.
Identifiers: *Des Moines River (Iowa).

The impact of commercial fishing on the biological characteristics of the channel catfish population of the lower Des Moines River in Iowa was studies in order to determine their potential for commercial exploitation. Baited hoop net and slat trap techniques were employed for 4615 net days and single-wing fyke nets were fished 542 net days yielding a total catch of 43,272 channel catfish with a combined weight of 17,845 lbs. Numerical composition of catfish in the catch ranged from 53.9% to 88%. Estimated population density was 101,774 fish in 1966, and 107,240 in 1969. Net exploitation removed nearly 20% of the numerical population in 1967. Growth of channel catfish was slow requiring nearly 3.8 years for fish to reach 10 inches TL. Length-frequency, length:weight ratio, growth and body condition showed no perceptible change after exploitation. Regression analysis isolated spawning activity as the most important factor influencing catch. Potential harvest was estimated to range from 296 to 998 lbs. per mile when the minimum size limit was 10 inches TL, however given current prices this would be insufficient to support a profitable commercial fishery. Extension of sport fishery to include entrapment types of gear is recommended. (Weaver-Wisconsin)
W74-01833

THE DEVELOPMENT OF COMMERCIAL FOOD FISH POPULATIONS AT RED ROCK RESERVOIR DURING THE FIRST 3-YEARS OF IMPOUNDMENT,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
J. Mayhew.
Available from NTIS as COM-73-10129 $3.00 in paper copy, $1.45 in microfiche. Iowa Fisheries Research Technical Series No 72-4, 1972. 56 p, 11 fig, 22 tab, 2 plates, 15 ref.

Descriptors: *Reservoir fisheries, *Commercial fish, *Baseline studies, *Market value, Fisheries, Reservoirs, Fish populations, Carp, Channel catfish, Buffalo fish, Carpsucker, Fish harvest, Fishing gear, Nets, Baits, Fish management, *Iowa.
Identifiers: *Lake Red Rock (Iowa), Des Moines River (Iowa), Gizzard shad.

Commercial food fish populations were studied during the first three years of the impoundment of the Lake Red Rock reservoir in Iowa. Measurement of changes in the food fish populations as the reservoir filled and as the populations were exploited by an experimental net fishery was the principal objective of the study. Fish species of main interest included carp, river carpsucker, buffalo and channel catfish. The fishery registered a total catch of 321,937 food fish weighing 151,533 lbs., dominated by carp in the first two years, and river carpsucker during the third. Commercial food fish comprised 80% of the fishery by number. Fishing gear included frame nets, gill nets, baited hoop nets and slat traps which yielded highest catch success (except for gill nets) in the second year. Early life history studies of gizzard shad and carp showed the former to be nearly equally distributed throughout the reservoir, and the latter to be more dense in the upper portion of the reservoir and in shallow embankments. Initial increase of impoundment elevation resulted in accelerated fish growth. The fishery showed no measurable effects on growth or body condition. Discussion of biological characteristics of the commercial food fish and recommendations for utilizing surplus stocks are presented. (Weaver-Wisconsin)
W74-01834

SALMON ROE BECOMES IMPORTANT FISHERIES PRODUCT,
J. Wiese.
Alaska Industry, p 14 and 57, December 1972.

Descriptors: *Marketing, *Fish eggs, *Salmon, Fish harvest, Canneries, Market value, Fisheries, Commercial fishing.
Identifiers: *Salmon roe, Offal utilization.

Just as halibut livers came into unexpected high demand forty years ago as a source of newly discovered vitamins, so salmon roe, the unspawned eggs of the female, are in accelerated demand by the affluent Japanese consumer. Substantial supply of salmon roe to the Japanese market began in 1964 when salmon roe utilization rose from between 100,000 and 600,000 to nearly 2.4 million pounds with a value of over $1.1 million. This demand growth has continued and in 1970 a bumper salmon harvest yielded 9.7 million pounds. Total product yield exceeded 47.4 million pounds in the decade between 1962 and 1971, inclusive, and had a value of nearly $49.9 million. This trend of profitable offal utilization has led to experimental use of male salmon milt sacs by pharmaceutical manufacturers, and cut-away portions of fish for industrial fishing bait and pet food manufacturing. (Weaver-Wisconsin)
W74-01836

EXTENDED RESULTS ON OPTIMAL INVESTMENT STRATEGIES IN SHRIMP FISHING,
Texas A and M Univ., College Station. Inst. of Statistics.
R. L. Sielken, Jr., R. G. Thompson, and R. R. Wilson.
Report TAMU-SG-211, December 1972. 27 p, 8 tab, 3 ref. NOAP 2-35213.

Descriptors: *Commercial fishing, *Investment, *Shrimp, Mathematical models, Boats.
Identifiers: *Optimal investment strategies, Integer programming, Commercial shrimp fishing.

This study is an extension to a deterministic model developed including alternative size boats in the investment opportunity set. Maximization, an objective of the firm's net worth, is constrained by three difference equations limiting the fisherman to positive investment in integer number of boats and restricting the amount of the borrowing and repayment schedule. Three numerical examples are presented for three different sets of parameter values and initial state values which reflect existing conditions of operation in the Gulf of Mexico during 1969. The mathematical programming problem associated with each of the three illustrative cases are solved and compared with sub-optimal conservative investment strategies of purchasing no additional fishing capacity and retaining all cash flows net of debt repayment as savings. Computer costs for implementing the model for the typical fishing firm are estimated at $25 per year. (Weaver-Wisconsin)
W74-01838

OPTIMAL CAPITAL ACCUMULATION IN A POLLUTED ENVIRONMENT,
Australian National Univ., Canberra.
For primary bibliographic entry see Field 05G.
W74-01840

THE STEEL INDUSTRY AND ENVIRONMENTAL QUALITY.
National Industrial Pollution Control Council, Washington, D.C. Steel Sub-Council.
For primary bibliographic entry see Field 05G.
W74-01841

THE ADAPTED PUBLIC INVESTMENT MODEL WITH PARTICULAR REFERENCE TO THE WATER RESOURCE SECTOR IN METROPOLITAN DEVELOPMENT,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
K. Elfers.
In: The Metropolitan Planning Process: An Exploratory Study, Appendix I-2, p 35-165. August 15, 1970. 1 tab, 1 append. N.C. Project PD-3. HUD Support under 701 (b).

Descriptors: *Planning, *Water resources, *Methodology, Cities.
Identifiers: *Metropolitan planning process, *Public investment model, Metropolitan development, Plan formulation, Review of consequences.

The ways in which planning for individual sectors, e.g. water resources, on a metropolitan basis influences, and is influenced by, planning for other sectors, and the problems and issues of 'comprehensive' planning over all sectors on the metropolitan scale are explored. Fundamental objectives identified for water resources planning and development are economic efficiency, income redistribution, and environmental quality. Conflicts between these are likely although planning may contribute to all three. The commonality of these objectives with those of other metropolitan sectors suggests the importance of interrelationships. Specific objectives are established in relation to particular needs or issues indicating courses of action. Specific objectives should by clearly related to the metropolitan framework of fundamental objectives. Criteria in the water resource sector include guidelines indicating planning directions, constraints on what is feasible, and rules for choice among alternatives. Perhaps the most important inter-sectoral aspect of criteria is that of consistency and compatibility. The objective of plan formulation in the water resource sector is to maximize an objective function subject to various constraints. It does not follow that a combination of similarly produced optimal sectoral plans will produce an optimal metropolitan plan because of linkages among sectors which must be identified. Review of consequences for the water resource sector will be concerned with the capacity of the planning process to cope with the unique needs of the metropolitan area. Review of consequences for other sectors will be important. (Edwards-North Carolina)
W74-01862

COMPUTER SYSTEM FOR THE DESCRIPTION AND EVALUATION OF COMMUNITY WATER SYSTEMS BASED ON REVERSE OSMOSIS DESALINATION,
Digital Systems Corp., Hanover, N.H.
For primary bibliographic entry see Field 03A.
W74-01938

ECONOMIC GUIDELINES FOR PUBLIC UTILITIES PLANNING,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-02114

6D. Water Demand

BOISE METROPOLITAN AREA SANITARY SEWAGE COLLECTION AND TREATMENT FACILITIES: PHASE II REPORT.
J-U-B Engineers, Inc., Boise, Idaho; and Barton, Stoddard, Milhollin and Higgins, Boise, Idaho.
For primary bibliographic entry see Field 05D.
W74-01854

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME ONE: INVENTORY FINDINGS AND FORECASTS.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01856

USE AND CONSERVATION OF WATER RESOURCES IN LITHUANIA (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV LITOVSKOY SSR),
For primary bibliographic entry see Field 04B.
W74-01970

USE AND CONSERVATION OF WATER RESOURCES IN THE UKRAINE (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV V UKRAINSKOY SSR),
For primary bibliographic entry see Field 05D.
W74-01971

WATER DEMAND OF SINGLE DWELLING RESIDENCES (DEMANDE EN EAU DE RESIDENCES UNIFAMILIALES),
D. Mascolo, and H. Demard.
INRS-Eau, Technical Report No 11, 1973. 88 p.

Descriptors: *Water supply, *Water distribution (Applied), *Water demand, *Distribution Systems, Cost-benefit analysis, Flowmeters, Data collections, *Canada.
Identifiers: *Residential water use, Residence time distribution, Peak demand, Remote reading, Meter reading.

Within the outline of a research program on water distribution system management the demand function of single dwelling units has been considered. The variations of the demand of nine single dwelling units (located in Sherbrooke, Quebec, Canada) has been studied on a 1 minute to 1 week time basis. The approach allowed the analysis of demand structure and a statistical definition of peaks intensity. The superposition of the demand of several residences has also been considered in a statistical way. (Cantin-INRS-Eau)
W74-02045

LOWER SAN JOAQUIN RIVER WATER QUALITY INVESTIGATION--APPENDIX F: PUBLIC HEARING,
California State Dept. of Water Resources, Sacramento.
D. J. Smith.
Available from State of Calif, Dept. of Water Resources, P.O. Box 388 Sacramento, Calif 95802. Bulletin No 143-5, June 1970. 9 p, 1 tab.

Descriptors: *Water quality, *Rivers, *California, Investigations, Conferences, Reviews, Evaluation, Water quality control, Water management (Applied), Water law, Water rights, State governments, Water demand, Water supply, Water utilization.
Identifiers: *Lower San Joaquin River (Calif), Public hearing.

On January 15, 1970, a public hearing on Bulletin No. 143-5, 'Lower San Joaquin River Water Quality Investigation', was conducted jointly in Modesto by the State Water Resources Control Board, represented by Kenneth L. Woodward, Chief, Water Rights Division; the California Regional Water Quality Control Board, Central Valley, represented by Robert L. Wall, Board Member; and the California Department of Water Resources, represented by Carl L.Stetson, District Engineer, San Joaquin District. A summary of written comments received before, during, and after the hearing and oral comments received at the hearing is presented. (Woodard-USGS)
W74-02142

6E. Water Law and Institutions

ARID URBAN WATER MANAGEMENT: SOME ECONOMIC, INSTITUTIONAL AND PHYSICAL ASPECTS,
Nevada Univ., Reno. Desert Research Inst.; and Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 06B.
W74-01662

HAWAII'S SYSTEM OF WATER RIGHTS: AN ECONOMIC EVALUATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
E. T. Morahan, and H. Yamauchi.
Available from the National Technical Information Service as PB-225 543/6, $3.00 in paper copy, $1.45 in microfiche. Technical Report No. 57, August 1972. 33 p, 5 ref. OWRR A-019-HI (2) 14-31-0001-3211.

Descriptors: *Water rights, *Water law, *Hawaii, Water allocation (Policy), Surface waters, Groundwater, Water resources development, Riparian rights, Institutional constraints, Land tenure, Investment.
Identifiers: *Property rights, Correlative rights.

The economic values of Hawaii's water resources associated with its unique traditional system of water rights and the correlative rights doctrine of the western world are described. The traditional Hawaiian system is intimately related to the land title system which was based on a common property concept. Water rights were often allocated according to the percentage of total labor contributed to the water resources development. Acquisition of water rights are limited to public or private grant, prescription or condemnation of previous rights. An exception exists in the case of artesian ground water for which rights are associated with owners of the overlying land by a correlative rights doctrine. Analysis indicates that the traditional system not only adequately defines water rights, but also ensures greater investment security than the correlative rights doctrine with its inherent tenure uncertainty. In addition, the traditional system allows greater flexibility for surface water reallocation without threatening investment security as offered by the correlative rights doctrine. (Weaver-Wisconsin)
W74-01785

ROLE OF THE FEDERAL GOVERNMENT IN CONTROLLING NUTRIENTS IN NATURAL WATERS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 05C.
W74-01808

DEVELOPMENT OF NUTRIENT CONTROL POLICIES IN CANADA,
Department of Energy, Mines and Resources, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05C.
W74-01809

REGULATING FLOOD-PLAIN DEVELOPMENT,
Chicago Univ., Ill. Dept. of Geography.
For primary bibliographic entry see Field 06F.
W74-01851

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-01852

THE NATIONAL WATER COMMISSION REPORT: A REVIEW,
Arizona Univ., Tuscon. Inst. of Government Research.
H. Ingram, T. G. Roefs, and D. J. Allee.
Institute Series No. 14, May 1973. 26 p, 12 ref.

Descriptors: *Reviews, *National Water Commission, Political aspects, Analysis, *Evaluation, Social values, Water values, *Appraisals, *Assessments, Social impact, Economic impact.

The ideas, assumptions, and framework of the draft of the National Water Commission report and the Commission's work are discussed. Lacking a defined decision space, the Commission seems to have taken the view that its charge was to address a range of issues about which controversies had occurred and to be idealistic about how arrangements to resolve these controversies might be made. Implicit in the report, though, are values that guided the Commission. These include rationality, efficiency, equity, faith in dollar measurements, support of new federalism, and advocacy of policy separate from administration. The implications of a non framework on the contents of the report are drawn. The report is characterized by a problem-by-problem focus and a disconnected set of 'should' statements. The report never specifies an effect space. Four major criticisms of the recommendations made in the report are: they are not consistent; they are not cross-referenced; they vary greatly in specificity, from the very general to the detailed; and they assume the existence of analytic and organizational resources which have not been shown to exist. A prognosis is made about the impact of the report. (Hoffman-North Carolina)
W74-01853

NORTH CAROLINA WATER PLAN-PROGRESS REPORT: CHAPTER 44, THE APPALACHIAN REGION IN NORTH CAROLINA.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01859

NORTH CAROLINA WATER PLAN-PROGRESS REPORT CHAPTER 25, THE CONCEPT OF BASIN AND REGION REPORTS IN THE NORTH CAROLINA WATER PLAN.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01860

NORTH CAROLINA WATER PLAN PROGRESS DURING F.Y. 1973.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
For primary bibliographic entry see Field 06B.
W74-01861

WATER QUALITY AND HUMAN HEALTH,
Ministry of Health, New Delhi (India).
For primary bibliographic entry see Field 05F.
W74-01865

INTERNATIONAL WATER QUALITY LAW,
New Mexico Univ., Albuquerque. School of Law.
For primary bibliographic entry see Field 05G.
W74-01869

SUMMARIES OF FOREIGN GOVERNMENT ENVIRONMENTAL REPORTS.
Environmental Protection Agency, Washington, D.C. Library Systems Branch.
For primary bibliographic entry see Field 05G.
W74-01886

INTERNATIONAL SYMPOSIUM ON HYDROLOGY OF WATERLOGGED AREAS (MEZHDUNARODNYY SIMPOZIUM PO GIDROLOGII ZABOLOCHENNYKH TERRITORIY),
For primary bibliographic entry see Field 02G.
W74-01963

SCIENTIFIC PRINCIPLES OF WATER LEGISLATION (NAUCHNYYE OSNOVY VODNOGO ZAKONODATEL'STVA),
V. I. Korzun.
Vodnyye Resursy, No 3, p 33-34, 1972.

Descriptors: *Water law, *Legislation, *Regulation, *Water utilization, *Water conservation, Water pollution control, Legal aspects, Jurisdiction, Water permits, Water rights, Planning.
Identifiers: *USSR.

The goals of the 'Principles of Water Law of the USSR and Union Republics,' adopted by the USSR Supreme Soviet on December 10, 1970, are the regulation of water relations to (1) ensure the rational use of water for the needs of the population and the national economy; (2) protect water from pollution, obstruction, and depletion; (3) prevent and eliminate the harmful action of water; (4) improve the condition of water bodies; (5) protect the rights of enterprises, organizations, institutions, and citizens; and (6) strengthen the law in the field of water relations. All waters of the USSR constitute a common state resource, which includes (1) rivers, lakes, reservoirs, other surface waters and water sources, as well as waters of canals and ponds; (2) subsurface waters and glaciers; (3) inland seas and other inland seawaters of the USSR; and (4) territorial waters of the USSR. The jurisdiction of the USSR and Union Republics in the field of regulation of water relations is defined together with the forms of water use, procedures and conditions for granting the use of water bodies, time periods of water use, and the rights and obligations of water users. To ensure the rational use and conservation of water and its protection from obstruction and depletion, a state water survey is maintained, current and long-range state water resources balances are compiled, and schemes are developed for the integrated utilization and conservation of water. The state water survey includes record-keeping data on water quantity and quality, registration of water users and water use, and record-keeping data on the utilization of water. (Josefson-USGS)
W74-01968

WATER POLLUTION CONTROL ACROSS THE NATION,
For primary bibliographic entry see Field 05G.
W74-01975

6F. Nonstructural Alternatives

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.

Technical Report. February, 1970. 73 p, 3 maps. HUD Project Fla-P-92.

Descriptors: *Flood protection, *Drainage systems, *Lakes, *Groundwater, *Florida, Flood control, Flood plain zoning, Swamps, Aquifers.
Identifiers: Orange County (Fla), Flood control districts, Seminole County (Fla), Osceola County (Fla).

Although flood protection receives the most attention in this study of water management in the Orlando metropolitan area, water quality and aquifer recharge are also examined. The 'people-water principle,' governs flood-protection policy, i.e. 'in existing urbanized areas, keep the water from interfering with the people, but in all other areas, keep the people from interfering with the water.' In borderline area between developed and undeveloped land, the choice of whether to drain land or buy it for flood plain should be decided on the basis of minimizing public expense. Recognizing the natural ability of swamps to accommodate floodwaters, swamp preservation is urged in preference to indiscriminate drainage and urbanization. Zoning, subdivision controls, and building codes should be used to restrict development in flood-prone areas whenever feasible. Reanalysis is asked for many drainage projects proposed by the Orange County Water Board and Central and Southern Florida Flood Control District. To preserve the quality of groundwater, urbanization should be limited in western Orange and Seminole Counties, primary aquifer recharge areas. To protect water quality, it is urged that lake levels be allowed to fluctuate naturally whenever feasible, that treated effluent be sprayed over land or into swamps instead of lakes and streams, and that septic tanks be disallowed in urban areas. Maps illustrate flood-prone areas, waters of known qualities, and aquifer recharge areas. Thirty-four watersheds are analyzed individually. Soil limitations for development, natural flood storage areas and urbanization trends are noted, existing water control plans are analyzed, and recommendations are made. (Stein-North Carolina)
W74-01850

REGULATING FLOOD-PLAIN DEVELOPMENT,
Chicago Univ., Ill. Dept. of Geography.
F. C. Murphy.
Research Paper No. 56 University of Chicago Press, Chicago, Ill. 1957. 204 p. 23Water resources, *Land use, *Planning, *Flood protection, *Flood plains, *Flood control, Environmental effects, Flood plain zoning, Flood plain insurance, Flood data, Flooding, Building codes, Political aspects, Legal aspects, Damages, Urbanization, Flood forecasting.
Identifiers: *Flood plain regulation, Channel encroachment, Subdivision regulation, Urban development.

This study, undertaken to ascertain what is necessary and practicable in the regulation of flood-plain development to reduce flood losses, sought to appraise current methods of regulating development in flood areas and to formulate a feasible, more realistic and nation-wide program for action in flood-plain regulation. Attention was directed toward areas subject to fresh-water flooding. Findings included the following: channel-encroachment laws, flood-plain zoning provisions, subdivision regulations, building codes and other methods of flood-plain regulation did not, as applied at the time, halt the continued increase of flood losses. State laws preventing channel encroachment were in force in only seven states. Flood-plain zoning provisions, usually attempted to restrict development in only the undeveloped portion of the flood plain, and designated little or none of the area which had already been flooded or only areas subject to frequent flooding. Criteria in subdivision regulations used to restrict flood-plain development usually covered only that area inundated by floods in the 15 to 35 year frequency range. Practically no instances of the use of building codes to regulate development in flood prone

areas could be found. Permanent evacuation of communities has had only limited success. Government acquisition of flood plain land has been more successful. Financial organizations make little or no effort to guide development in flood areas. The role of flood insurance is discussed. A series of government actions at federal, state and local levels are recommended to reduce flood losses. (Edwards-North Carolina)
W74-01851

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME TWO: ALTERNATIVE PLANS AND RECOMMENDED PLAN.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01857

FLOOD PLAIN INFORMATION, RABBIT CREEK, ANCHORAGE, ALASKA.
Army Engineer District, Anchorage, Alaska.

Prepared for the Greater Anchorage Area Borough, May 1973. 27 p, 12 fig, 29 plate, 2 tab.

Descriptors: *Floods, *Flood plains, *Flood control, *Flood data, *Alaska, Hydrologic data, Flood profiles, Flood forecasting, Historic floods, Streamflow, Flow characteristics, Data collections, Photography.
Identifiers: *Anchorage (Alaska), *Rabbit Creek (Alaska), Intermediate regional flood, Standard project flood.

The portion of the Greater Anchorage Area Borough, Alaska, covered by this report is subject to flooding from Rabbit Creek. The properties along this stream are primarily residential and were moderately damaged by the flood of June 1964. The areas in the flood plain which are now under pressure for development are extensive. Although large floods have occurred in the past, studies indicate that even larger floods are possible. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain utilization. This history of flooding in the Rabbit Creek area identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles, and cross sections. Solutions to flood problems are not provided; however, a suitable basis for the adoption of land-use controls is furnished to guide flood-plain development and thereby prevent intensification of loss and damage. (Woodward-USGS)
W74-01873

FLOOD PLAIN INFORMATION, PASCAGOULA-GAUTIER COASTAL AREAS, JACKSON COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W74-02121

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 04A.
W74-02129

6G. Ecologic Impact of Water Development

ENVIRONMENTAL SURVEY OF THE TETON RIVER AND HENRY'S FORK OF THE SNAKE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 04A.
W74-01839

NATURAL CONCERN: AN ECOLOGICAL ANALYSIS OF BIBB COUNTY.
Macon-Bibb County Planning and Zoning Commission, Macon, Ga.

March, 1972. 39 p, photos, 80 ref. Price: $1.00.

Descriptors: *Urbanization, *Environmental effects, *Pollutants, Natural resources, Water resources, Soils, Wildlife, *Ecology, Planning, Atmosphere, *Georgia.
Identifiers: *Macon (Ga), Bibb County (Ga).

Urban growth in Bibb County, Georgia, like growth in most of the country, has moved forward without much consideration for the natural environment and relationships between urban activities and natural processes. The nature of several elements and processes in the environment is described to help build a better understanding of the natural environment and of how man can live more compatibly within it. The elements covered are the air, water resources, soils, plant life, and wildlife. Each element is discussed in terms of its physical characteristics, its importance to man and to the total environment, the causes and nature of pollution of or losses in the element, and the consequences for man when these adverse conditions occur. Sensory pollutants and radioactive pollution also are discussed. The relationship of these elements and the broader ecological systems to urban development is described especially with regard to the dynamic and renewable nature of most natural systems and resources. The use of ecologic principles and the identification of development constraints in planning urban growth and the implementation of conservation programs to protect natural resources are recommended. (Elfers-North Carolina)
W74-01848

OPEN SPACE: PRELIMINARY PLAN.
Los Angeles Dept. of City Planning, Calif.

City Plan Case No 24533. January, 1973. 19 p, photos, 1 map.

Descriptors: *Planning, *Natural resources, *Conservation, Recreation, Parks, Urbanization, Environmental effects, Ecology, Coordination, *California.
Identifiers: *Open space, Land use controls, Policies, *Los Angeles (Cal).

The plan is intended to be a guide for governmental agencies and interested citizens for the identification, preservation, and acquisition of open space in Los Angeles. The plan applies to both public and private open space and consists of five basic parts: a definition of goals and objectives, formulations of policies and of standards and criteria, and presentations of the plan itself and of the programs to implement it. The basic goals include the conservation of open space for recreation, for health and safety, and for urban form and identity, the preservation of vital environmental resources such as water and air, and the conservation of unique natural features and scenic areas. Numerous policies related to these goals are presented under four categories: general policies, policies for privately owned open space, policies for publicly owned open space, and policies for publicly owned open areas such as reservoirs, land-fill sites, and utility rights-of-way. Standards and criteria are developed to cover scenic drives, scenic corridors, density of development in open space zones, historical sites, the identification of open spaces, and the priority of open space types. The plan is essentially based on a map delineating existing and desirable open space lands. The desirable lands include ecologically important areas and a city-wide trail system. Programs to implement the policies and plan include further studies, legislation to control open areas, and specific proposals for both private and public open space management. (Elfers-North Carolina)
W74-01849

MISSISSIPPI/MINNEAPOLIS-A PLAN AND PROGRAM FOR RIVERFRONT DEVELOPMENT.
Riverfront Planning Team of Minneapolis Planning and Development, Minn.
For primary bibliographic entry see Field 03D.
W74-01855

A CONSERVATION ELEMENT FOR THE SACRAMENTO GENERAL PLAN.
Sacramento City Planning Commission, Calif.

Final draft. June 7, 1973. 25 p, 3 fig.

Descriptors: *Natural resources, *Conservation, *Water supply, Water quality, *Environmental effects, Groundwater, Planning, Water resources, Soils, Urbanization, Flood control, *California, Water conservation.
Identifiers: Land use controls, Goals, Policies, *Sacramento (Calif).

The purpose of the Conservation Element is to provide a framework for the conservation and development of natural resources within the City of Sacramento, California. Several basic goals and general policies for the total environment are identified. Land resources, water resources and biological resources are described in more detail. Primary water supply for municipal usage comes from the American River and the Sacramento River. Supplemental water is provided from Lake Folsom by contract purchase. Adequate surface supply for future growth appears to be available. Pollution from agricultural waste, increasing urbanization, and use of the rivers for recreation threatens to impair the present high water quality. Cetralization of waste water treatment facilities is planned. Some areas will require surface water drainage and flood controls. Water management policies recommended for adoption include: prohibit urban type use in all flood prone areas by use of zoning and special permit regulations; develop and improve water supply facilities; encourage participation of private and public groups in planning and development of water resources; meet standards set by the Regional Water Quality Control Board for both surface and ground water; encourage well users to utilize municipal water supply; continue cooperation with other agencies to reduce ground water extractions to a safe annual yeild. The report and its policies were adopted by the City Council on June 7, 1973. (Hufschmidt-North Carolina)
W74-01864

ECOLOGY OF SALT MARSHES AND SAND DUNES,
For primary bibliographic entry see Field 02L.
W74-01984

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02004

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02005

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF TROJAN NUCLEAR PLANT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02006

ENVIRONMENTAL SCIENCE TECHNOLOGY INFORMATION RESOURCES,
S. B. Tuwiner.
Noyes Data Corporation: Park Ridge, N.J., London, England, 1973. 218 p. Illus. Pr. $18.00.
Identifiers: Books, *Environmental information resources, Science, Technology, *Information resources, *Technical information.

This book is the result of the rapidly increasing demand for methods by which environmental information may be obtained. The first section includes the proceedings and panel discussion of the Symposium on Environmental Science Technology Information Resources, including papers on the following specific topics: resources and industrial cooperation on environmental control at the American Petroleum Institute; Environmental Protection Agency (EPA) and its research and development program; government sources of information on environmental control; data vs information; environmental control resources of a large technical library. Section 2 contains selected papers presented at the National Environmental Information Symposium, including papers on the following specific topics: technical information programs in the EPA; federal environmental data centers and systems; scientific and technical information centers concerned with the biological sciences; scientific and technical primary publications carrying environmental information; secondary technical and scientific information journals; applications of socioeconomic information to environmental research and planning; and selected listing of information centers and services available in the socio-economic area. The final section contains a bibliography of basic governmental, institutional and organizational documents assembled by the United Nations Conference on the Human Environment, including references in the following areas: basic documents received from states invited to the conference: basic documents prepared within the United Nations system; basic documents received from other sources; draft position papers; and other papers. The 3 conferences covered above all occurred in 1972.--Copyright 1973, Biological Abstracts, Inc.
W74-02100

THE WET AND THE DRY: TRADITIONAL IRRIGATION IN BALI AND MOROCCO,
Institute for Advanced Study, Princeton, N.J.
C. Geertz.
Hum Ecol. Vol 1, No 1, p 23-39. 1972.
Identifiers: *Bali, Climates, Cultural factors, Ecological studies, *Irrigation, *Morocco.

The comparative perspective is of central importance to effective analysis in human ecology. 'Traditional' irrigation systems in 2 quite disparate settings are compared: east central Morocco and southeastern Bali. Bali, which has a topical climate and a plentiful water supply, displays a highly collective approach to the organization of irrigation facilities. Morocco, which is essentially an arid country, displays, on the contrary, a much more individual, property-based approach to water regulation. The internal organization of these 2 regimes is described, and their connection with more general cultural and ecological factors is traced, in an attempt to demonstrate that patterns of adaptation are susceptible to the same pattern of anlysis as other aspects of social and cultural life. The contrast between the strongly group-oriented Balinese approach to water control and distribution and the highly individualistic Moroccan one is said to extend in an overall way to the 2 societies as a whole.--Copyright 1973, Biological Abstracts, Inc.
W74-02106

07. RESOURCES DATA

7B. Data Acquisition

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.

Available from GPO, Washington, D C 20402. Price $13.65 per set (Sect A and B). National Aeronautics and Space Admin Rept NASA SP-327, 1730 p, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Surveys, *Monitoring, Land use, Geologic mapping, Terrain analysis, Water resources, Snow, Ice, Lakes, Glaciers, Management, Planning, Water resources development, Wildlife.
Identifiers: *ERTS.

The first Earth Resources Technology Satellite (ERTS-1) was launched on July 23, 1972. In the 7 months since it was activated, over 34,000 scenes of the earth have been obtained covering all major land masses and about 75% of the world's land area. Some areas, such as the United States, have been imaged at least 12 times. The purpose of this program is to provide an assessment of remote sensing from a satellite as a technique for inventorying and monitoring the earth's resources to provide better management of these resources. The quality of the products produced by the ERTS-1 system is, from a resolution and radiometric accuracy viewpoint, quite consistent with prelaunch estimates. In the geometric sense, these data products are somewhat better than prelaunch estimates. (See also W74-01163 and W74-01664 thru W74-01712) (Knapp-USGS)
W74-01663

ERTS-1 DATA PRODUCT PREFORMANCE,
General Electric Co., Philadelphia, Pa. Space Systems Div.
For primary bibliographic entry see Field 07C.
W74-01664

IDENTIFICATION OF WINTER WHEAT FROM ERTS-1 IMAGERY,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 03F.
W74-01665

SEMI-AUTOMATIC CROP INVENTORY FROM SEQUENTIAL ERTS-1 IMAGERY,
California Univ., Riverside. Dept. of Geography.
For primary bibliographic entry see Field 03F.
W74-01666

CROP IDENTIFICATION USING ERTS IMAGERY,
South Dakota State Univ., Brookings. Remote Sensing Inst.
For primary bibliographic entry see Field 03F.
W74-01667

IDENTIFICATION OF LARGE MASSES OF CITRUS FRUIT AND RICE FIELDS IN EASTERN SPAIN,
For primary bibliographic entry see Field 03F.
W74-01668

ENGINEERING ANALYSIS OF ERTS DATA FOR SOUTHEAST ASIAN AGRICULTURE,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 03F.
W74-01669

AN INTERREGIONAL ANALYSIS OF NATURAL VEGETATION ANALOGUES USING ERTS-1 IMAGERY,
Earth Satellite Corp., Berkeley, Calif.
For primary bibliographic entry see Field 03F.
W74-01670

NATURAL VEGETATION INVENTORY,
Oregon State Univ., Corvallis. Rangeland Resources Program.
For primary bibliographic entry see Field 04A.
W74-01671

VEGETATIVE AND GEOLOGIC MAPPING OF THE WESTERN SEWARD PENINSULA, ALASKA, BASED ON ERTIS-1 IMAGERY,
Alaska Univ., College.
For primary bibliographic entry see Field 04A.
W74-01672

ERTS-1 EVALUATION OF NATURAL RESOURCES MANAGEMENT APPLICATIONS IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01673

EVALUATION OF ERTS-1 IMAGERY IN MAPPING AND MANAGING SOIL AND RANGE RESOURCES IN THE SAND HILLS REGION OF NEBRASKA,
Nebraska Univ., Lincoln. Dept. of Agronomy.
For primary bibliographic entry see Field 04A.
W74-01674

MONITORING CALIFORNIA'S FORAGE RESOURCE USING ERTS-1 AND SUPPORTING AIRCRAFT DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01675

TESTING THE USEFULNESS OF ERTS-1 IMAGERY FOR INVENTORYING WILDLAND RESOURCES IN NORTHERN CALIFORNIA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01676

INTERPRETATION OF ERTS-MSS IMAGES OF A SAVANNA AREA IN EASTERN COLOMBIA.
Centro Interamericano de Fotointerpretacion, Bogota (Colombia).
For primary bibliographic entry see Field 02G.
W74-01677

DELINEATION OF MAJOR SOIL ASSOCIATIONS USING ERTS-1 IMAGERY,
Tennessee Univ., Knoxville. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-01678

EVALUATION OF REMOTE SENSING IN CONTROL OF PINK BOLLWORM IN COTTON,
California Univ., Riverside. Citrus Research Center and Agricultural Experiment Station.
For primary bibliographic entry see Field 03F.
W74-01679

APPLICATION OF ERTS-1 IMAGERY AND UNDERFLIGHT PHOTOGRAPHY IN THE DETEC-

TION AND MONITORING OF FOREST INSECT INFESTATIONS IN THE SIERRA NEVADA MOUNTAINS OF CALIFORNIA,
Natural Resources Management Corp., Berkeley, Calif.
For primary bibliographic entry see Field 03F.
W74-01680

ERTS-1 IMAGERY AND HIGH FLIGHT PHOTOGRAPHS AS AIDS TO FIRE HAZARD APPRAISAL AT THE NASA SAN PABLO RESERVOIR TEST SITE,
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 04A.
W74-01681

PHENOLOGY SATELLITE EXPERIMENT,
Cornell Univ., Ithaca, N.Y. Div. of Atmospheric Sciences.
For primary bibliographic entry see Field 04A.
W74-01682

FOREST AND RANGE MAPPING IN THE HOUSTON AREA WITH ERTS-1 DATA,
Lockheed Electronics Co., Inc., Houston, Tex. Houston Aerospace Systems Div.
For primary bibliographic entry see Field 04A.
W74-01683

APPLICATION OF ERTS-1 DATA TO ANALYSIS OF AGRICULTURAL CROPS AND FORESTS IN MICHIGAN,
Michigan Agricultural Experiment Station, East Lansing.
For primary bibliographic entry see Field 03F.
W74-01684

CROP SPECIES RECOGNITION AND MENSURATION IN THE SACRAMENTO VALLEY,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 03F.
W74-01685

THE RESULTS OF AN AGRICULTURAL ANALYSIS OF THE ERTS-1 MSS DATA AT THE JOHNSON SPACE CENTER,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 03F.
W74-01686

AGRICULTURAL APPLICATIONS OF ERTS-1 DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
For primary bibliographic entry see Field 03F.
W74-01687

IDENTIFICATION OF AGRICULTURAL CROPS BY COMPUTER PROCESSING OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 03F.
W74-01688

IDENTIFICATION AND MAPPING OF SOILS, VEGETATION, AND WATER RESOURCES OF LYNN COUNTY, TEXAS BY COMPUTER ANALYSIS OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 03F.
W74-01689

EVALUATION OF ERTS-1 IMAGERY FOR GEOLOGICAL SENSING OVER THE DIVERSE GEOLOGICAL TERRANES OF NEW YORK STATE,
Geological Survey, Albany, N.Y.; and New York State Museum and Science Service, Albany.
For primary bibliographic entry see Field 07C.
W74-01690

ANALYSIS AND APPLICATION OF ERTS-1 DATA FOR REGIONAL GEOLOGICAL MAPPING,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
For primary bibliographic entry see Field 07C.
W74-01691

GEOLOGY OF UTAH AND NEVADA BY ERTS--1 IMAGERY,
Utah Univ., Salt Lake City. Dept. of Geological and Geophysical Sciences.
For primary bibliographic entry see Field 07C.
W74-01692

PRELIMINARY GEOLOGIC APPLICATION OF ERTS-1 IMAGERY IN ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 07C.
W74-01693

A COMPARISON OF GEMINI AND ERTS IMAGERY OBTAINED OVER SOUTHERN MOROCCO,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01694

CAPABILITY OF ERTS-1 IMERGY TO INVESTIGATE GEOLOGICAL AND STRUCTURAL FEATURES IN A SEDIMENTARY BASIN (BASSIN PARISIEN, FRANCE),
Bureau de Recherches Geologiques et Minieres, Orleans (France). Departement Carte Geologique et Geologie Generale.
For primary bibliographic entry see Field 03F.
W74-01695

APPLICATION OF ERTS-1 MULTISPECTRAL IMAGERY TO MONITORING THE PRESENT EPISODE OF ACCELERATED EROSION IN SOUTHERN ARIZONA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02J.
W74-01696

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA, AND AUSTRALIA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01697

ESTABLISHMENT, TEST, AND EVALUATION OF A PROTOTYPE VOLCANO-SURVEILLANCE SYSTEM,
National Center for Earthquake Research, Menlo Park, Calif.
P. Ward, J. P. Eaton, E. Endo, D. Harlow, and D. Marquez.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentation, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 305-315, 1973. 5 fig, 1 tab, 10 ref.

Descriptors: *Remote sensing, *Telemetry, *Volcanoes, *Satellites (Artificial), *Monitoring, *Earthquake, Seismographs, Instrumentation, Warning systems, Surveys, Data collections, Data processing.
Identifiers: ERTS.

A volcano-surveillance system utilizing 23 miltilevel earthquake counters and 6 biaxial borehole tiltmeters is being installed and tested on 15 valcanoes in 4 states and 4 foreign countries. The purpose of this system is to give early warning when apparently dormant valcanoes are becoming active. The data are relayed through the ERTS-Data Collection System to Menlo Park for analysis. Installation was completed on 1972 on the volcanoes St. Augustine and Iliamna in Alaska, Kilauea in Hawaii, Baker, Rainier and St. Helens in Washington, Lassen in California, and at a site near Reykjavik, Iceland. Installation continues and should be completed in April 1973 on the volcanoes Santiaguito, Fuego, Agua and Pacaya in Guatemala, Izalco in El Salvador and San Cristobal, Telica and Cerro Negro in Nicaragua. (See also W74-01663) (Knapp-USGS)
W74-01698

SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND--PRELIMINARY RESULTS FROM ANALYSIS OF MSS IMAGERY,
Geological Survey, Reston, Va. EROS Program Office.
For primary bibliographic entry see Field 02C.
W74-01699

PRELIMINARY ASSESSMENT OF GEOLOGICAL APPLICATIONS OF ERTS-1 IMAGERY FROM SELECTED AREAS OF THE CANADIAN ARTIC,
Gregory Geoscience Ltd., Ottawa (Ontario).
For primary bibliographic entry see Field 02C.
W74-01700

EXPLOITATION OF ERTS-1 IMAGERY UTILIZING SNOW ENHANCEMENT TECHNIQUES,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 02C.
W74-01701

MAPPING QUATERNARY LANDFORMS AND DEPOSITS IN THE MIDWEST AND GREAT PLAINS BY MEANS OF ERTS-1 MULTISPECTRAL IMAGERY,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01702

GLACIATION OF NORTHERN WYOMING INTERPRETED FROM ERTS-1,
Wyoming Univ., Laramie. Dept. of Geology.
For primary bibliographic entry see Field 02C.
W74-01703

FIRST-LOOK ANALYSIS OF GEOLOGIC GROUND PATTERNS ON ERTS-1 IMAGERY OF MISSOURI,
Geological Survey, Rolla, Mo.
For primary bibliographic entry see Field 07C.
W74-01704

RATIO MAPS OF IRON ORE DEPOSITS, ATLANTIC CITY DISTRICT, WYOMING,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07C.
W74-01705

USE OF ERTS-1 IMAGES IN THE SEARCH FOR PORPHYRY COPPER DEPOSITS IN PAKISTANI BALUCHISTAN,
Geological Survey, Washington, D.C.

For primary bibliographic entry see Field 07C.
W74-01706

RELATION OF ERTS-1 DETECTED GEOLOGIC STUCTURE TO KNOWN ECONOMIC ORE DEPOSITS,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 07C.
W74-01707

PRELIMINARY GEOLOGIC INVESTIGATIONS IN THE COLORADO PLATEAU USING ENHANCED ERTS IMAGES,
Jet Propulsion Lab., Pasadena, Calif.
For primary bibliographic entry see Field 07C.
W74-01708

STRUCTURAL GEOLOGICAL ANALYSIS OF NEVADA USING ERTS-1 IMAGES: A PRELIMINARY REPORT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01709

REGIONAL TECTONIC CONTROL OF TERTIARY MINERALIZATION AND RECENT FAULTING IN THE SOUTHERN BASIN RANGE PROVINCE, AN APPLICATION OF ERTS-1 DATA,
Argus Exploration Co., Newport Beach, Calif.
For primary bibliographic entry see Field 07C.
W74-01710

ERTS APPLICATIONS IN EARTHQUAKE RESEARCH AND MINERAL EXPLORATION IN CALIFORNIA,
Rockwell International Corp., Thousand Oaks, Calif. Science Center.
For primary bibliographic entry see Field 07C.
W74-01711

SOME ASPECTS OF ACTIVE TECTONISM IN ALASKA AS SEEN ON ERTS-1 IMAGERY,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 07C.
W74-01712

VISUAL RECORDER FOR ENERGIZE-DEENERGIZE CYCLES,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
L. C. Benz, E. J. Doering, and D. E. Dubuque.
Soil Sci Soc Am Proc. Vol 36, No 6, p 968. 1972, Illus.
Identifiers: *Drainage, *Energize-denergize cycle, Instrumentation, Pump, *Visual recorders.

A water stage recorder was modified to give a continuous visual record of energize-deenergize cycles. This type of system can be used wherever and whenever it is necessary to have a visual record of events showing how equipment or a process is functioning. (This system worked well in a pump drainage experiment.)--Copyright 1973, Biological Abstracts, Inc.
W74-01771

COMPARATIVE STUDY BETWEEN THE EVAPORATION CALCULATED BY VARIOUS FORMULAS AND PAN EVAPORATION MEASURED IN THREE TROPICAL AREAS, (IN SPANISH),
Narino Univ., Pasto (Columbia). Facultad de Ciencias Agriculturas.
For primary bibliographic entry see Field 02D.
W74-01870

COMPOUND WEIR STUDY, (IN CHINESE)
Taipei Hydraulic Research Lab., (Taiwan).
For primary bibliographic entry see Field 02E.
W74-01875

OCEAN CURRENT MONITORING EMPLOYING A NEW SATELLITE SENSING TECHNIQUE,
National Environmental Satellite Service, Washington, D.C.
For primary bibliographic entry see Field 02E.
W74-01876

EVALUATION OF WATER PENETRATION PHOTOGRAPHY FOR BOTTOM SEDIMENT MAPPING IN LITTLE HARBOR, CATALINA ISLAND,
Geosource International Inc., Seal Beach, Calif. Geoscience Div.
D. T. Hodder.
Paper presented at American Society of Photogrammetry and American Society on Surveying and Mapping, Fall National Convention Symposium on Remote Sensing in Oceanography, October 2-5, 1973. 16 p, 7 fig, 5 ref.

Descriptors: *Mapping, *Bottom sediments, *Remote sensing, *California, Coasts, Methodology, Aerial photography, Photogrammetry, Data collections, Sampling, Sediments, Correlation analysis, Evaluation, Bathymetry.
Identifiers: *Multispectral photography.

An experiment is described to map bottom sediment types by remote sensing techniques. The specific techniques are narrow pass band (+ or - 100 angstroms) interference filtered photography, in the blue and green light regions. The coastal site chosen in California for the investigation is seasonally characterized by turbid waters of poor visibility and a nonuniform distribution of bottom sediment types. Both mass wasting and fluvial processes contribute to the bottom sediment types. This particular site was selected since an independent prior detailed mapping by conventional methods was available. On-site spectrophotometric measurements of upwelling and downwelling light were made during winter storm periods simultaneous with the photographic overflights. Sediment samples were collected to represent the available types and their reflectance spectra measured in the lab. The four bands of photography were then density sliced electronically to enhance the apparent contrast between bottom features. The agreement between remote sensing and classical bottom mapping was particularly good in the Little Harbor area. The only exceptions were the small clay pockets which were either too small to be resolved or washed away since the prior mapping. (Woodard-USGS)
W74-01949

REMOTE SENSING OF WATER POLLUTION AND PHYTOPLANKTON BY OPTICAL METHODS (DISTANTSIONNOYE OBNARUZHENIYE ZAGRYAZNENIY VODNYKH BASSEYNOV I FITOPLANKTONA OPTICHESKIMI METODAMI),
Leningrad State Univ. (USSR).
For primary bibliographic entry see Field 05A.
W74-01966

EXAMINATION OF POISSON DISTRIBUTED MEASURING VALUES (DIE UBERPRUFUNG POISSONVERTEILTER MESSWERTE),
Siemens und Halske A.G., Karlsruhe (West Germany).
R. Plesch.
Zeitschrift fur Analytische Chemie, Vol 265, No 2, p 114-121, June 14, 1973. 7 tab, 8 ref.

Descriptors: *Statistical methods, *Instrumentation, Equipment, Measurement.
Identifiers: *Poisson distribution, *Errors, Accuracy, Normal distribution.

The results of analytical measurement based on elementary events follow the poisson distribution which is derived from fundamental principles. In practice this distribution is converted into a singular normal distribution. By combining the properties of both distributions it is possible to state a quick examination of the statistical purity of a series of measurements with the aim to find out the existence and kind of troubles in measuring equipment. The criteria for determining a drift and an outlier in a series of measurements are treated. (Little-Battelle)
W74-01977

A NEW ELECTRICAL SOIL-MOISTURE MEASURING UNIT,
Michigan State Univ., East Lansing. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-01978

A RECORDING DEVICE FOR MEASURING RESPIRATORY MOVEMENTS OF AQUATIC INSECTS,
Waterloo Lutheran Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 02I.
W74-01996

THE RELATION BETWEEN MOISTURE MEASUREMENTS WITH A NEUTRON PROBE AND SOIL TEXTURE,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 02G.
W74-02074

THE ARCTIC DREDGE, A BENTHIC BIOLOGICAL SAMPLER FOR MIXED BOULDER AND MUD SUBSTRATES,
National Museum of Natural Sciences, Ottawa (Ontario).
For primary bibliographic entry see Field 02C.
W74-02085

OBSERVATIONS ON SAMPLING PRE-IMAGINAL POPULATIONS OF BLACKFLIES (DIPT., SIMULIIDAE) IN WEST CAMEROON,
R. H. L. Disney.
Bull Entomol Res. Vol 61, No 3, p 485-503. 1972. Illus.
Identifiers: *Black flies, Diptera, Larvae populations, *Sampling, *Simuliidae, *West Cameroon.

The use of standarized artificial substratum units (SASUs) for sampling preimaginal populations of Simulium is reviewed and the results then given of experiments with SASUs in rivers and artificial streams in West Cameroon in 1968-70. The increase of downstream drift of larvae by night is attributed to the increased activity of associated fauna at night. The numbers of larvae settling on SASUs is partly a function of how long the latter have been set and partly due to the pattern of fluctuation in river depth. Any particular SASU appears to be selective in relation to the different species of Simulium available for settlement. A new index of uniformity is proposed for comparing the diversity of Simulium faunas occurring on different substrata.--Copyright 1973, Biological Abstracts, Inc.
W74-02108

7C. Evaluation, Processing and Publication

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.
For primary bibliographic entry see Field 07B.
W74-01663

ERTS-1 DATA PRODUCT PREFORMANCE,
General Electric Co., Philadelphia, Pa. Space Systems Div.
B. T. Bachofer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Report NASA SP-327, p 1-9, 1973. 11 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, Calibrations, Data collections, Aerial photography.
Identifiers: *ERTS.

The quality of the products produced by the ERTS-1 system during its initial period of operations is, from a resolution and radiometric accuracy viewpoint, quite consistent with prelaunch estimates. In the geometric sense, these data products are somewhat better (and in a few cases considerably better) than prelaunch estimates. (See also W74-01663) (Knapp-USGS)
W74-01664

VEGETATIVE AND GEOLOGIC MAPPING OF THE WESTERN SEWARD PENINSULA, ALASKA, BASED ON ERTIS-1 IMAGERY,
Alaska Univ., College.
For primary bibliographic entry see Field 04A.
W74-01672

ERTS-1 EVALUATION OF NATURAL RESOURCES MANAGEMENT APPLICATIONS IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01673

INTERPRETATION OF ERTS-MSS IMAGES OF A SAVANNA AREA IN EASTERN COLOMBIA.
Centro Interamericano de Fotointerpretacion, Bogota (Colombia).
For primary bibliographic entry see Field 02G.
W74-01677

FOREST AND RANGE MAPPING IN THE HOUSTON AREA WITH ERTS-1 DATA,
Lockheed Electronics Co., Inc., Houston, Tex. Houston Aerospace Systems Div.
For primary bibliographic entry see Field 04A.
W74-01683

IDENTIFICATION AND MAPPING OF SOILS, VEGETATION, AND WATER RESOURCES OF LYNN COUNTY, TEXAS BY COMPUTER ANALYSIS OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 03F.
W74-01689

EVALUATION OF ERTS-1 IMAGERY FOR GEOLOGICAL SENSING OVER THE DIVERSE GEOLOGICAL TERRANES OF NEW YORK STATE,
Geological Survey, Albany, N.Y.; and New York State Museum and Science Service, Albany.
Y. W. Isachsen. R. H. Fakundiny, and S. W. Forster.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: VolI--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 223-230, 1973. 2 fig, 7 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *New York, Mapping, Structural geology, Topography, Geomorphology, Data collections, Data processing, Surveys.
Identifiers: ERTS.

Film positives of ERTS-1 imagery, both as received from NASA and photographically reprocessed, were analyzed by conventional and color additive viewing methods. The imagery reveals bedrock and surficial geological information at various scales. Features which can be identified to varying degrees include boundaries between major tectonic provinces, lithological contacts, foliation trends within massive gneisses, faults, and topographic lineaments. In New York the greatest amount of spectral geology is displayed in the Adirondack region where bedrock geology is strongly linked to topography. The majority of the faults and lineaments shown on the geologic map of New York at 1:250,000 appear in the ERTS imagery. In addition, many new linears were detected, as well as a number of anomalous curvilinear elements, some circular in plan and measuring up to 25 km in diameter which do not bear any strong relationship to mapped geological contacts. Surficial features observed in the imagery include glaciated valleys and cross channels, glacial streamline forms, ice marginal channels, and glacial lake deposits. (See also W74-01663) (Knapp-USGS)
W74-01690

ANALYSIS AND APPLICATION OF ERTS-1 DATA FOR REGIONAL GEOLOGICAL MAPPING,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
D. P. Gold, R. R. Parizek, and S. A. Alexander.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 231-245, 1973. 2 fig, 35 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, Pennsylvania, Mapping, Structural geology, Topography, Geomorphology, Data collections, Data processing, Surveys, *Pennsylvania.
Identifiers: ERTS.

Combined visual and digital techniques of analysing ERTS-1 data for geologic information were tried in Pennsylvania. The major physiographic and structural provinces show up well. Supervised mapping following the imaged expression of known geologic features on ERTS data from parts of eastern Pennsylvania delimited the Diabase Sills and the Precambrian rocks of the Reading Prong with remarkable accuracy. From unsupervised mapping, transgressive linear features are apparent in unexpected density and exhibit strong control over river valley and stream channel directions. They are unaffected by bedrock type, age, or primary structural boundaries which suggests they are either rejuvenated basement joint directions on different scales or they are a recently impressed structure possibly associated with a drifting North American plate. (See also W74-01663) (Knapp-USGS)
W74-01691

GEOLOGY OF UTAH AND NEVADA BY ERTS--1 IMAGERY,
Utah Univ., Salt Lake City. Dept. of Geological and Geophysical Sciences.
M. L. Jensen.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 247-255, 1973. 3 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Utah, *Nevada, Mapping, Exploration, Surveys, Mineralogy, Limnology, Hydrology, Topography, Data collections.
Identifiers: ERTS.

ERTS-1 imagery covering Utah and Nevada is studied as an aid in structural geology, mineral exploration, and limnological and hydrological aspects. Limnological features of algal blooms and varying biological activities Utah Lake and the Great Salt Lake are evident on the imagery. Major structural breaks, lineages, or trends are abundant throughout the area of study. The correlation of positive aeromagnetic anomalies with the trends suggests near surface intrusive bodies, not yet exposed at the surface, that can be tested for possible associated mineralization. (See also W74-01663) (Knapp-USGS)
W74-01692

PRELIMINARY GEOLOGIC APPLICATION OF ERTS-1 IMAGERY IN ALASKA,
Geological Survey, Menlo Park, Calif.
E. H. Lathram, I. L. Tailleur, W. W. Patton, Jr., and W. A. Fischer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 257-264, 1973. 4 fig, 7 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Alaska, Structural geology, Exploration, Mapping, Surveys.
Identifiers: ERTS.

Linears and faults on ERTS-1 images corroborate the existence of possible deep-seated structures first noted on Nimbus IV images. These structures may have influenced location of mineralization. ERTS images also display more comprehensively and explicitly than heretofore possible the thrust-faulted, complexly folded and open-folded terranes and strongly contrasting lithologies in northwestern Alaska, provide new data on faults in central Alaska, and display previously unknown lineations that suggest concealed folds in northern Alaska. The concealed folds are verifiable only by geophysical techniques and may be significant to petroleum exploration. (See also W74-01663) (Knapp-USGS)
W74-01693

A COMPARISON OF GEMINI AND ERTS IMAGERY OBTAINED OVER SOUTHERN MOROCCO,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
H. W. Blodget, and A. T. Anderson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentation, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 265-272, 1973. 4 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, Structural geology, Exploration, Geology, Data collections, Aerial photography, Surveys.
Identifiers: ERTS, *Morocco.

A mosaic constructed from three ERTS MSS band 5 images enlarged to 1:500,000 compares favorably with a geologic map of southern Morocco and a Gemini 5 photo pair of all similar scale. A comparative plot of lineations and generalized geology on the three formats show that a significantly greater number of probable fractures are visible on the ERTS imagery than on the Gemini photography. Both orbital formats show several times more lineaments than were previously mapped. Definite structure-mineralization relationships exist; this defines underdeveloped areas which are prospective for mineralization. More detailed mapping is possible using MSS imagery than on Gemini 5 photographs, and in addition, the ERTS format is not restricted to limited coverage. (See also W74-01663) (Knapp-USGS)
W74-01694

CAPABILITY OF ERTS-1 IMERGY TO INVESTIGATE GEOLOGICAL AND STRUCTURAL FEATURES IN A SEDIMENTARY BASIN (BASSIN PARISIEN, FRANCE),
Bureau de Recherches Geologiques et Minieres, Orleans (France). Departement Carte Geologique et Geologie Generale.
For primary bibliographic entry see Field 03F.
W74-01695

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA, AND AUSTRALIA,
Geological Survey, Denver, Colo.
E. D. McKee, C. S. Breed, and L. F. Harris.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 291-303, 1973. 2 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Aerial photography, *Dunes, *Mapping, *Geomorphology, Provenance, Sediment transport, Deserts, Terrain analysis, Data collections, Data processing, Africa, Asia, Australia.
Identifiers: *Sand seas, ERTS.

Major types of desert sand seas are classified on the basis of morphologic pattern and lineation. For analyzing patterns of deposits on ERTS images (where the visible forms are mostly dune complexes rather than individual dunes) enhancement of imagery, differentiation of dune sand, recognition of atmospheric conditions, and study of the effect of varying sun angles and other seasonal influences upon interpretation of ERTS imagery are all being used. Further analyses and final checks are made by comparative studies of air photos or ground data available for each site. After completion of thematic maps portraying the pattern and lineation of sand bodies, data on directions and intensity of prevailing and other winds are plotted on corresponding bases, as a preliminary to determination of internal stuctures through ground truth. (See also W74-01663) (Knapp-USGS)
W74-01697

ESTABLISHMENT, TEST, AND EVALUATION OF A PROTOTYPE VOLCANO-SURVEILLANCE SYSTEM,
National Center for Earthquake Research, Menlo Park, Calif.
For primary bibliographic entry see Field 07B.
W74-01698

PRELIMINARY ASSESSMENT OF GEOLOGICAL APPLICATIONS OF ERTS-1 IMAGERY FROM SELECTED AREAS OF THE CANADIAN ARTIC,
Gregory Geoscience Ltd., Ottawa (Ontario).
For primary bibliographic entry see Field 02C.
W74-01700

MAPPING QUATERNARY LANDFORMS AND DEPOSITS IN THE MIDWEST AND GREAT PLAINS BY MEANS OF ERTS-1 MULTISPECTRAL IMAGERY,
Geological Survey, Denver, Colo.
R. B. Morrison, and G. R. Hallberg.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 353-361, 1973. 4 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geological mapping, *Geomorphology, Surveys, Mapping, Structural geology, Glacial drift, Alluvium, Quaternary period.
Identifiers: ERTS.

ERTS-1 multispectral images are effective for differentiating many kinds of Quaternary surficial deposits and landforms units in Illinois, Iowa, Missouri, Kansas, Nebraska, and South Dakota. Examples of features that have been distinguished are: the more prominent end moraines of the last glaciation; certain possible palimpsests of older moraines mantled by younger deposits; various abandoned river valleys, including suspected ones deeply filled by deposits; river terraces; and known faults and a few previously unmapped lineaments that may be faults. The ERTS images are being used for systematic mapping of Quaternary landforms and deposits in about 20 potential study areas. Some study areas, already well mapped, provide checks on the reliability of mapping from the images. For other study areas, previously mapped only partly or not at all, ERTS maps are the first comprehensive, synoptic ones, and should be useful for regional land use planning and groundwater, engineering geology and other environmental applications. (See also W74-01663) (Knapp-USGS)
W74-01702

FIRST-LOOK ANALYSIS OF GEOLOGIC GROUND PATTERNS ON ERTS-1 IMAGERY OF MISSOURI,
Geological Survey, Rolla, Mo.
W. H. Allen, J. A. Martin, and D. L. Rath.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 371-378. 2 fig, 15 ref.

Descriptors: *Remote sensing, *Satellite (Artificial), *Geologic mapping, Surveys, Data collections, Geomorphology, *Missouri, Structural geology.
Identifiers: ERTS.

Examination of ERTS-1 data for selected areas of Missouri revealed not only many of the known geologic features but also a number of unknown linear, circular and arcuate ground patterns. The number of new geologic elements that have been brought to light, as well as the sharp definition and probable extensions of several known geologic features, point out the importance of multispectral imagery via satellite and the synoptic views which they provide. To date, analysis and interpretations have been a first-look visual examination of the unenhanced projected images. (See also W74-01663) (Knapp-USGS)
W74-01704

RATIO MAPS OF IRON ORE DEPOSITS, ATLANTIC CITY DISTRICT, WYOMING,
Environmental Research Inst. of Michigan, Ann Arbor.
R. K. Vincent.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 379-386, 1973. 6 fig, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Exploration, *Surveys, *Geologic mapping, *Wyoming, Structural geology, Aerial photography, Iron, Data collections.
Identifiers: ERTS, *Iron ore deposits.

A spectral ratio techniques using ERTS data was tested in a region at the southern end of the Wind River Range, Wyoming. ERTS analog ratio images were found generally better than either ERTS single-channel images or high altitude aerial photos for discrimination of vegetation from nonvegetation. Some linear geological features smaller than the ERTS spatial resolution may be seen as clearly in ERTS ratio and single-channel images as in high altitude aerial photography. Geochemical information is extractable from ERTS data. Good preliminary quantitative agreement between ERTS-derived ratios and laboratory-derived reflectance ratios of rocks and minerals encourage plans to use lab data as training sets for a simple ratio gating logic approach to automatic recognition maps. Atmospheric corrections are needed to make the ratio method, and possibly other types of data processing, consistent over large geographical and temporal displacements. The ratio method, designed for geochemical prospecting and geologic mapping, should also be useful for other scientific applications from satellite data as well. (See also W74-01663) (Knapp-USGS)
W74-01705

USE OF ERTS-1 IMAGES IN THE SEARCH FOR PORPHYRY COPPER DEPOSITS IN PAKISTANI BALUCHISTAN,
Geological Survey, Washington, D.C.
R. G. Schmidt.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 387-394, 1973. 3 fig, 4 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Terrain analysis, Copper, Surveys, Exploration, Investigations, Mining, Data collections, Aerial photography.
Identifiers: ERTS, *Pakistan (Saindak), *Porphyry copper.

Geomorphic features related to a known porphyry copper deposit at Saindak, western Chagai District, Pakistan, are easily distinguished on ERTS-1 images. New geologic information from the images was used in conjunction with known geology to evaluate one previously known prospect area and to suggest two additional ones. The Saindak deposit is in an area of relatively easily eroded folded sedimentary and volcanic rocks. The deposit is characterized by an elongate zone of easily sulfide-rich rock surrounded by a resistant rim of hornfels and altered rock. Both this rim and the central sulfide-rich valley are conspicuous features on the images. A rim like that at Saindak does not form if regional metamorphism has increased the resistance of the country rock to erosion, as in the Pakistan-Iran border region northwest of Saindak. (See also W74-01663) (Knapp-USGS)
W74-01706

RELATION OF ERTS-1 DETECTED GEOLOGIC STUCTURE TO KNOWN ECONOMIC ORE DEPOSITS,
Stanford Univ., Calif. Dept. of Geology.
E. I. Rich.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 395-402, 1973. 4 fig, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mining, *Geologic mapping, *Structural geology, Mercury, Fractures (Geologic), *California, Data collections.
Identifiers: ERTS, Coast Ranges (Calif).

A preliminary analysis of ERTS-1 imagery of the Northern Coast Ranges and Sacramento Valley, California, has disclosed a potentially important fracture system which may be one of the controlling factors in the location of known mercury deposits in the Coast Ranges and which appears to be associated with some of the oil and gas fields within the Sacramento Valley. Recognition of this fracture system may prove to be an extremely useful exploration tool, hence careful analysis of subsequent ERTS imagery might delineate areas for field evaluation. (See also W74-01663) (Knapp-USGS)
W74-01707

PRELIMINARY GEOLOGIC INVESTIGATIONS IN THE COLORADO PLATEAU USING ENHANCED ERTS IMAGES,
Jet Propulsion Lab., Pasadena, Calif.
A. F. H. Goetz, F. C. Billingsley, D. Elston, I. Lucchitta, and E. M. Shoemaker.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 403-411, 1973. 4 fig, 9 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Hydrology, Structural geology, Terrain analysis, *Arizona, Data collections, Data processing, Groundwater.
Identifiers: ERTS, *Colorado Plateau.

Bulk and computer enhanced frames of the Verde Valley region of Central Arizona, an area which has been well mapped, were analyzed for structural information and rock unit identification. Most major rock units in areas of sparse ground cover are identifiable on enhanced false-color composites. Regional structural patterns are strikingly visible on the ERTS images. New features were identified which will aid in the search for goundwater near Flagstaff, Sedona, and Stewart Ranch. (See also W74-01633) (Knapp-USGS)
W74-01708

STRUCTURAL GEOLOGICAL ANALYSIS OF NEVADA USING ERTS-1 IMAGES: A PRELIMINARY REPORT,
Geological Survey, Washington, D.C.
L. C. Rowan, and P. H. Wetlaufer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 413-423, 1973. 3 fig, 20 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Structural geology, *Mining, *Nevada, Volcanoes, Aerial photography, Exploration, Data collections.
Identifiers: ERTS.

Structural analysis of Nevada using ERTS-1 images shows several previously unrecognized lineaments which may be the surface manifestations of major fault or fracture zones. Principal trends are NE, NW, NNE-NNW, and ENE. Two lineament zones, the Walker Lane and Midas Trench lineament system, transect the predominantly NNE-NNW trending mountain ranges for more than 500 km. 50 circular features were delineated. Comparison with known Tertiary volcanic centers suggests 8 new centers. Preferred distribution of mines and Tertiary volcanic centers along some of the major lineaments suggests a genetic relationship. The intersection of these previously unmapped lineaments in northwestern Nevada is the location of a highly productive metallogenic district. In the Walker Lane, ENE-trending lineaments appear to be related to the occurrence of productive ore deposits. (See also W74-01663) (Knapp-USGS)
W74-01709

REGIONAL TECTONIC CONTROL OF TERTIARY MINERALIZATION AND RECENT FAULTING IN THE SOUTHERN BASIN RANGE PROVINCE, AN APPLICATION OF ERTS-1 DATA,
Argus Exploration Co., Newport Beach, Calif.
I. C. Bechtold, M. A. Liggett, and J. F. Childs.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics Space Admin Rept NASA SP-327, p 425-432, 1973. 6 fig, 14 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Exploration, Mining, Surveys, Data collections, California, Nevada, Arizona, Structural geology, Terrain analysis, Faults (Geologic), Volcanoes, Great Basin.
Identifiers: ERTS.

ERTS-1 imagery and field work in the southern Basin-Range Province of California, Nevada, and Arizona shows regional tectonic control of volcanism, plutonism, mineralization, and faulting. During the mid-Tertiary, the area was the site of plutonism and volcanism fed by fissure systems now exposed as dike swarms. Dikes, elongate plutons, and normal faults trend generally northward. Gold and silver mineralization is closely related to Tertiary igneous activity. Similarities in ore, structural setting, and rock types define a metallogenic district of high potential for exploration. The ERTS imagery also provides a basis for regional inventory of small faults which cut alluvium. This capability for efficient regional surveys of Recent faulting should be considered in land use planning, geologic hazards study, civil engineering and hydrology. (See also W74-01663) (Knapp-USGS)
W74-01710

ERTS APPLICATIONS IN EARTHQUAKE RESEARCH AND MINERAL EXPLORATION IN CALIFORNIA,
Rockwell International Corp., Thousand Oaks, Calif. Science Center.
M. Abdel-Gawad, and J. Silverstein.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p433-450, 1973. 5 fig, 20 ref.

Descriptors: *Remote sensing, *Satellites (artificial), *Geologic mapping, *California, Structural geology, *Earthquakes, Faults (geologic), *Mining, Exploration, Investigations, Surveys, Data collections.
Identifiers: ERTS.

ERTS imagery can be effectively utilized to identify, locate, and map faults which show geomorphic evidence of geologically recent breakage. Several important faults not previously known have been identified. In parts of California, Sonora, Mexico, Arizona, and Nevada areas known for historic seismicity are often characterized by abundant evidence of recent fault and crustal movements. There are many examples of seismically quiet areas where outstanding evidence of recent fault movements is observed. ERTS-1 imagery could be effectively utilized to delineate areas susceptible to earthquake recurrence which, on the basis of seismic data alone, may be misleadingly considered safe. ERTS data can also be utilized in planning new sites in the geophysical network of fault movement monitoring and strain and tilt measurements. ERTS data on transverse faults and their interaction with the San Andreas system in west central California are providing significant scientific insights into the geological history of the state. Significant observations are described derived from the study of the fault pattern revealed in ERTS-1 imagery of the central part of the Pacific mountain system of California. The practical applications of this work relate directly to problems of earthquake hazards and mineral exploration. (See also W74-01663) (Knapp-USGS)
W74-01711

SOME ASPECTS OF ACTIVE TECTONISM IN ALASKA AS SEEN ON ERTS-1 IMAGERY,
Alaska Univ., College. Geophysical Inst.
L. D. Gedney, and J. D. VanWormer.
In: Symposium on Signifacant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 451-457, 1973. 2 fig, 7 ref.

Descriptors: *Remote sensing, Satellites (artificial), *Geologic mapping, *Structural geology, *Alaska, Earthqukes, Faults (GEOLOGIC), Surveys, Data collections, Hazards.
Identifiers: ERTS.

ERTS-1 imagery is useful in delineating structural features in Alaska which have never been recognized on the ground. Previously unmapped features such as seismically active faults and major structural lineaments are especially evident. Among the more significant results of this investigation is the discovery of an active strand of the Denali fault. The new fault has a history of scattered seismicity and was the scene of a magnitude 4.8 earthquake on October 1, 1972. Perhaps of greater significance is the disclosure of a large scale conjugate fracture system north of the Alaska Range. This fracture system appears to result from compressive stress radiating outward from around the outside of the great bend of the Alaska Range at Mt. McKinley. One member of the fracture system was the scene of a magnitude 6.5 earthquake in 1968. The potential value of ERTS imagery to land use planning is reflected in the fact that the site of the proposed bridge and oil pipline crossing of the Yukon River lies very near this fault. (See also W74-01663) (Knapp-USGS)
W74-01712

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-01714

ESTIMATING THE LAND SLOPE OF MOUNTAIN WATERSHEDS,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
For primary bibliographic entry see Field 02A.
W74-01715

FLOOD PLAIN INFORMATION, RABBIT CREEK, ANCHORAGE, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 06F.
W74-01873

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.

Basic Data Report, 1973. 779 p, 4 tab, 21 ref.

Descriptors: *Water quality, *Sediment transport, *Chemical analysis, *Texas, Basic data collections, Surface waters, Sampling, Water temperature, Inorganic compounds, Nutrients, Bacteria, Physical properties, Water analysis, Chemical properties.

Water-quality records for Texas (1971 water year) include a description of the sampling station and tabulations of the samples analyzed. The description of the sampling station gives the location, drainage area, periods of record for the various water-quality data, extremes of the pertinent data, and general remarks. Data on the quality of surface water were collected from designated sampling sites at predetermined intervals such as once daily, weekly, monthly or less frequently. Water-quality information is presented for chemical, biochemical, and microbiological quality, water temperature, and fluvial sediment. Chemical quality includes concentrations of individual disolved constituents and certain properties or characteristics such as hardness, sodium adsorption ratio, specific conductance, and pH. The biochemical information includes qualitative and quantitative analyses of particulate inorganic and amorphous matter present. Microbiological information includes quantitative identification of cer-

tain bateriological indicator organisms. Water-temperature data represent once-daily observations except for stations where a continuous temperature recorder furnishes information from which daily minimums and maximums are obtained. Fluvial-sediment information is given for suspended-sediment discharges and concentrations and for particle-size distribution of suspended sediment and bed material. (Woodard-USGS)
W74-01885

GEOLOGY OF BURKE COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-01923

COMPUTER SYSTEM FOR THE DESCRIPTION AND EVALUATION OF COMMUNITY WATER SYSTEMS BASED ON REVERSE OSMOSIS DESALINATION,
Digital Systems Corp., Hanover, N.H.
For primary bibliographic entry see Field 03A.
W74-01938

INDEX OF STREAM GAGING STATIONS IN AND ADJACENT TO CALIFORNIA, 1970,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 02E.
W74-01943

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01950

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR HONEY CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01951

FLOOD PLAIN INFORMATION, KENAI RIVER, PHASE I, KENAI PENINSULA BOROUGH, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 04A.
W74-01952

THE SIMULATION OF SUBSURFACE EFFECTS ON THE DIURNAL SURFACE THERMAL REGIME IN COLD REGIONS,
Michigan Univ., Ann Arbor. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W74-01988

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS AND SOLID WASTE FROM NUCLEAR POWER PLANTS FOR 1972.
Directorate of Regulatory Operations (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W74-02011

FLOOD PLAIN INFORMATION, PASCAGOULA-GAUTIER COASTAL AREAS, JACKSON COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W74-02121

HYDROLOGIC REPORT LITTLE CALUMET RIVER AND TRIBUTARIES, PART I.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 02E.
W74-02127

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-02137

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02138

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W74-02139

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MUKEWATER CREEK, COLORADO RIVER BASIN TEXAS, 1971,
Geological Survey, Austin, Tes.
For primary bibliographic entry see Field 04D.
W74-02140

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02141

GEOLOGY OF MOUNTRAIL COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-02145

08. ENGINEERING WORKS

8A. Structures

ANALYSIS OF COAL REFUSE DAM FAILURE, MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA--VOLUME 2, APPENDICES.
Wahler (W.A.) and Associates, Palo Alto, Calif.

Available from NTIS, Springfield, Va 22151 PB-215 143 Price $6.00 printed copy; $1.45 microfiche. Contract report, February 1973 (Vol 2 of 2 vol). 16 fig, 2 photo, 8 tab. USBM Contract S-0122084.

Descriptors: *Dam failure, *Coal mine wastes, *Floods, *West Virginia, *Flood damage, Data collections, Geologic investigations, Geological surveys, Rotary drilling, Sampling, Soil investigations, Permeability, Aerial photography, Mapping. Identifiers: *Saunders (W Va), *Middle Fork Buffalo Creek (W Va).

On February 26, 1972, a coal refuse dam, owned and operated by the Buffalo Mining Company, failed near Saunders, W. Va. The immediate consequences of the flooding were 118 persons dead and 7 reported missing, the loss of over 500 homes, and extensive flood damage to other property in Buffalo Creek Valley. Basic data were gathered during the investigation of the Middle Fork Valley dams and refuse bank above Saunders during field investigations of the site conducted from the end of March through mid-September 1972. This information consisted of field mapping, subsurface exploration and sampling by means of auger drill holes, field density tests, field permeability tests, aerial photography, vane shear tests, and cone penetration tests. (See also W73-14163)
W74-01939

AN OLD PIPE LINE BROUGHT BACK TO LIFE,
Westchester County Water Agency, White Plains, N.Y.
For primary bibliographic entry see Field 08F.
W74-02134

8B. Hydraulics

THE ROLE OF MOLECULAR DIFFUSION IN DISPERSION THEORY,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 02E.
W74-01713

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR NORTH CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01884

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01889

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01950

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR HONEY CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01951

WAVE DEFLECTING DEVICE FOR A SEA WALL,
Keller-Dee Research and Development Corp., Northbrook, Ill. (assignee).
D. F. Keller.
U. S. Patent No. 3,757,527, 4 p, 6 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 448, September 11, 1973.

Descriptors: *Patents, *Shore protection, *Sea walls, Coastal structures, Engineering structures. Identifiers: *Wave action.

The wave deflecting device is a plate mounted in each of the troughs of the sea wall with a flat surface of the plate lying on a first plane extending between a horizontal plane and a vertical plane of the wall. The plate is provided with a configuration to substantially conform to the cross section of the trough taken on the first plane so to block passage of water moving in the trough and to deflect the upwardly moving water in the trough which is caused by a wave back towards the body of water. One embodiment includes a lateral portion at one end of the plate which overlie adjacent ridges to

deflect water moving upwardly therealong back to the body of water. Each of the plates is provided with attachment means for mounting the plate in the trough of the wall on the first plane. (Sinha - OEIS)
W74-02035

COMPARISON OF SEWER DISCHARGE HYDROGRAPHS COMPUTED FROM IN--SEWER MEASUREMENTS AND FROM SYNTHESIZED HYDROGRAPH PROCEDURES, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02135

8D. Soil Mechanics

FLOOD CONTROL PROJECT MAINTENANCE AND REPAIR -- 1971 INSPECTION REPORT,
California State Dept. of Water Resources, Sacramento.
J. MacClanahan, E. W. Danley, Jr., H. F. DeWitt, and W. Wolber.
Available from State of Calif, Documents Section, P.O. Box 20191 Sacramento, Calif. 95820 Price $1.00. Bulletin No. 149-71, June 1972. 29 p, 8 tab.

Descriptors: *Flood control, *Levees, *California, Engineering structures, Maintenance, Repairing, Channel improvement, Flood protection, Data collections.

In 1971, flood control levees extending 1,540 miles were maintained under cooperative state and federal agreements in the Sacramento and San Joaquin Valleys and in Lake and Placer Counties. Such flood control projects include the Sacramento, American, San Joaquin, Calaveras, and Truckee Rivers; Littlejohns and Middle Creeks; Merced County Stream Group; Sacramento River Bank Protection Project, and the Lower San Joaquin Flood Control Project; and the Fresno County Stream Group. Twice during 1971, Department of Water Resources specialists inspected and classified the quality of levee maintenance performed by maintaining agencies. This bulletin reports both the 1971 ratings and the method of rating, discusses proper maintenance procedures, and reports levee construction by the U.S. Army Corps of Engineers, channel maintenance, applications for levee encroachments, and the condition of the flood control project structures. Maps locate project levees and local maintenance agencies. (Woodard-USGS)
W74-01945

8F. Concrete

AN OLD PIPE LINE BROUGHT BACK TO LIFE,
Westchester County Water Agency, White Plains, N.Y.
G. J. Matt.
Paper presented at American Water Works Association Annual Meeting, Denver, Colorado, June 17, 1971. 12 p.

Descriptors: Pipelines, *Water conveyance, *Linings, *Sealants, Water loss, *Municipal water, New York, Water demand, Cements, Water distribution (Applied), Water supply development, Water supply, Water delivery, Water conveyance.
Identifiers: *Cement linings, *Pipeline restoration, *New York City.

An old pipe line, leaky and abandoned by New York City, was brought back to life through a concrete lining program in Westchester County. Built in 1881, the cast iron pipes were made without a lead notch and, because of this, were incapable of providing water under high pressure without developing leaks. But a test showed that a leak of 50 gallons per minute under a pressure of 50 psi could be eliminated with a concrete lining. This prevented all leaks up to 125 psi water pressure. Since th maximum pressure required for the pipe is less than 100 psi, it became feasible to restore this pipe to use. After the formation of a County Water District, the restoration of the water main was engineered and later accomplished. An unusual feature of the system is that New York City legally had to provide water to all communities in counties where it had a pipeline. Therefore, this line was already connected to communities in Westchester County although it had been abandoned by New York City and these communities. Yonkers, Mount Vernon, White Plains, Scarsdale and other cities may ultimetely be served in part by this renovated pipeline. (Pertner)
W74-02134

8G. Materials

CALCIUM SULFATE SCALE CONTROL IN HIGH TEMPERATURE DESALTING PROCESSES,
California Univ., Los Angeles.
For primary bibliographic entry see Field 03A.
W74-01926

8I. Fisheries Engineering

SURVEY OF THE SOUTH CAROLINA OYSTER FISHERY,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
For primary bibliographic entry see Field 06C.
W74-01830

SOME BIOLOGICAL CHARACTERISTICS OF A CHANNEL CATFISH POPULATION IN THE LOWER DES MOINES RIVER WITH AN EVALUATION OF POTENTIAL COMMERCIAL HARVEST,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
For primary bibliographic entry see Field 06C.
W74-01833

THE DEVELOPMENT OF COMMERCIAL FOOD FISH POPULATIONS AT RED ROCK RESERVOIR DURING THE FIRST 3-YEARS OF IMPOUNDMENT,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
For primary bibliographic entry see Field 06C.
W74-01834

ANADROMOUS FISH WATER REQUIREMENTS,
California State Dept. of Fish and Game, Sacramento.
J. L. Horton, and D. W. Rogers.
Available from NTIS, Springfield, Va 22151 as COM-73-10696. Contract Report for NOAA, National Marine Fisheries Service (Project AFC-7), June 1969. 13 p, 3 fig, 3 tab, 5 ref. Bureau of Fisheries Contract 14-17-007-746.

Descriptors: Water resources development, *Streams, *Spawning, *Salmon, *California, Correlation analysis, Streamflow, Flow rates, Streambeds, Physical properties, Gravels, Mapping, Reach (streams), Fisheries, Channel morphology.
Identifiers: Van Duzen River (Calif), Humboldt County (Calif).

A streamflow requirements study for king salmon spawning in the Van Duzen River in California was initiated on August 1, 1967 and completed on July 1, 1968. The objective was to provide an estimate of the amount of spawning area available at various streamflows to help evaluate the effects of possible water developments in the Van Duzen River basin. Two half-mile study sections were selected and areas containing good spawning gravel were mapped. Depths and velocities were measured over the areas of good gravel at various streamflows. These measurements were plotted on the maps. Areas of good gravel that met depth and velocity criteria were determined. Earlier surveys indicated that king salmon spawn throughout a 30-mile section of the river. The results of plotting depth and velocity data between 50 and 1,500cfs show that a discharge of 700 cfs over the study areas would provide the maximum amount of king salmon spawning area for the flows measured. Estimates from flow data indicate that a discharge of 770 cfs measured at the U.S. Geological Survey stream gage (Van Duzen River near Bridgeville) would provide an average of about 700 cfs over the 30-mile spawning area. (Woodard-USGS)
W74-01880

STAGES OF DEVELOPMENT OF YOUNG SALMON IN THE CHAIKEND SALMON-BREEDING FACILITY, (IN RUSSIAN),
P. M. Bagirova.
Izv Akad Nauk Az SSR Ser Biol Nauk. 2. p 83-87. 1972.
Identifiers: *Breeding facilities, *Mortality, *Salmon, USSR (Chaikend), *Water temperature.

Four different stages in the development of young salmon under the specific conditions prevailing in the Chaikend (USSR) salmon-breeding facility were distinguished. Massive death due to elevated water temperatures was observed. Young salmons reaching an age of 14-15 mo. thrive in waters with a salt content at a temperature of 10-15C.--Copyright 1973, Biological Abstracts, Inc.
W74-01901

A FEASIBILITY PILOT PROJECT FOR A METHOD OF OPEN WATER FISH FARMING.
Oceanic Inst. Waimanalo, Hawaii. Makajoo Oceanic Center.

Available from NTIS, Springfield, Va. 22151, as COM-72-11121 Price $3.00 printed copy, $1.45 microfiche. Final Report OI-72-78-1, June 1, 1972. 40 p. NOAA Sea Grant GH-78.

Descriptors: *Marine fisheries, *Fish farming, *Hawaii, Methodology, Marine biology, Plastic pipes, Nets, Ecosystems, Oceans, Coasts, Walls, Ponds, Engineering structures, Commercial fish, Economics, Maintenance costs, Evaluation.
Identifiers: *Undersea mariculture, *Salt-water ponds (Hawaii).

The final project report includes two separate reports. The first report describes sea bottom habitat enhancement; shellfish culture; production and trapping of detrital feeders, carnivores or herbivores; materials and methods; colonization of plastic strips; fish populations; and light regime. The second report discusses the costs involved in rebuilding walled coastal fish ponds and the economics of Hawaiian pond operation. (See also W74-01914 and W74-01915) (Woodard-USGS)
W74-01913

AN EXPERIMENT IN UNDERSEA MARICULTURE,
Oceanic Inst. Waimanalo, Hawaii. Makapuu Oceanic Center.
K. S. Norris, W. D. Madden, and P. S. Norris.
A Feasibility Pilot Project for a Method of Open Water Fish Farming Report OI-72-78-1, p 1-21, June 1, 1972. 4 fig, 2 tab, 9 ref. NOAA Sea Grant GH-78.

Descriptors: *Marine fish, *Marine fisheries, *Marine algae, *Oceans, *Fish farming, Methodology, Plastic pipes, Nets, Marine algae, Marine biology, Ecosystems, Marine plants, Data collections, Fish populations.
Identifiers: *Undersea mariculture.

The potentials of maricultural activity in moderate to deep ocean water below the turbulent zone are idsucssed. An experiment is described in which a 6 x 12.5 meter PVC pipe frame was anchored in 26 meters of water off Oahu, Hawaii, to which were attached 4500 2.5-meter long, 10-cm meter wide strips of two kinds of plastic (polyethylene and olefin) each with a buoyant bubble plastic border which floated the strips more or less vertically in the water. The course of microfloral and faunal establishment on this bed was followed for 5 months, as was invasion by local fishes. Algal growth quickly (3 weeks) reached maximum standing crop, though the composition of the biota fluctuated constantly throughout the test period. At maximum expression the biota was an incrustation of algal, colonies, diatom films, some barely visible foliose and branching colonies, including hydroids, flagellates, minute worms and molluscs, and a large complement of sea hares (Notarchus lineolatus), the largest organisms actually living on the plastic constantly. Heavy grazing both by passing fish and the hares was evident for most of the test period. Fish of 15 species gathered around or in the beds, with the density of grazing scarids and acanthurids increasing throughout the test. Possible economic potentials are discussed. (See also W74-01913) (Woodard-USGS)
W74-01914

REFURBISHING AN HAWAIIAN FISHPOND,
Oceanic Inst. Waimanalo, Hawaii. Makapuu Oceanic Center.
K. S. Norris, and J. J. Crouch.
In: A Feasibility Pilot Project for a Method of Open Water Fish Farming, Report OI-72-78-1, p 25-40, June 1, 1972. 4 fig, 2 tab, 5 ref. NOAA Sea Grant GH-78.

Descriptors: *Marine fisheries, *Sea water, *Ponds, *Hawaii, *Fish farming, Coasts, Engineering structures, Walls, Commercial fish, Economics, Evaluation, Planning, Maintenance costs.
Identifiers: *Salt-water ponds (Hawaii), Pond operation maintenance.

Approximately 200 stone-walled fishponds were built by early Hawaiians along the shores of the islands, chiefly on shallow reef flats. The majority of these ponds have fallen into decay from tidal wave damage, siltation and clogging with mangroves. But some are in a fair state of preservation and are still used for low-level production of mullet and milkfish. The ancient ponds are of much historic interest, and efforts have been made repeatedly to preserve the best as historical monuments. Most plans to refurbish the ponds and to reinstitute mullet and other mariculture have failed before repair has been completed. Still, the popularity of 'restoration' remains as a way to (1) assure the continued existence of the ponds in the face of land development, hotel and marina plans; and (2) provide a profitable commercial venture, especially considering the increasing cost of mullet. To test the economic feasibility of restoration, the refurbishment of a moderate-sized pond on Molokai Island for experimental culture of mullet and other pond organixms was undertaken. Total refurbishment of half the pond has required 18 months for completion and cost a total of $50,799. The details of refurbishment are described and costs are listed, with an idealized projection for the refurbishment and long-term operation of other ponds. (See also W71-01913) (Woodard-USGS)
W74-01915

OCCURRENCE OF EUBOTHRIUM CRASSUM (BLOCH, 1779) (CESTODA: - PSEUDOPHYLLIDEA) IN BROWN TROUT SALMO TRUTTA L., AND RAINBOW TROUT S. GAIRDNERI RICHARDSON, 1836, FROM HAMNINGFIELD RESERVOIR, ESSEX,
Marine Lab., Aberdeen (Scotland).
For primary bibliographic entry see Field 02H.
W74-02091

PARAMETERS INFLUENCING MINIMUM STREAMFLOW,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 02E.
W74-02119

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

SUMMARIES OF FOREIGN GOVERNMENT ENVIRONMENTAL REPORTS.
Environmental Protection Agency, Washington, D.C. Library Systems Branch.
For primary bibliographic entry see Field 05G.
W74-01886

10B. Reference and Retrieval

THE SOUTHERN WATER RESOURCES SCIENTIFIC INFORMATION CENTER,
North Carolina State Univ., Raleigh. D. H. Hill Library.
W. C. Lowe, and S. S. Rose.
Southeastern Librarian, p 31-33, Spring 1973. OWRR A-999-NC (34). 14-31-0001-3833.

Descriptors: *Information retrieval, *Bibliographies, Publications, *North Carolina, *Southeast U.S., *Information exchange, Data, Collections, Data storage and retrieval, Documentation.

The Southern Water Resources Scientific Information Center, one of three regional centers of the Water Resources Scientific Information Center, is located at North Carolina State University. Characteristics of system and services available to potential users in the southeast U.S. are described. (Howells-North Carolina)
W74-02116

10C. Secondary Publication And Distribution

BIBLIOGRAPHY AND INDEX OF OKLAHOMA GEOLOGY--1972,
Geological Survey, Norman, Okla.
For primary bibliographic entry see Field 02F.
W74-01916

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S SAVANNAH RIVER, S.C., PRODUCTION SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02008

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S NATIONAL REACTOR TESTING STATION, IDAHO.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02009

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S OAK RIDGE, TENN. SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02010

ENVIRONMENTAL SCIENCE TECHNOLOGY INFORMATION RESOURCES,
For primary bibliographic entry see Field 06G.
W74-02100

10D. Specialized Information Center Services

THE SOUTHERN WATER RESOURCES SCIENTIFIC INFORMATION CENTER,
North Carolina State Univ., Raleigh. D. H. Hill Library.
For primary bibliographic entry see Field 10B.
W74-02116

10F. Preparation of Reviews

BIBLIOGRAPHY ON OPTIMIZATION OF IRRIGATION SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03F.
W74-01657

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.
For primary bibliographic entry see Field 05C.
W74-01732

A LITERATURE REVIEW ON THE BIOLOGICAL PURIFICATION METHODS OF SEWAGE IN CHEMICAL-PHARMACEUTICAL PLANTS, (IN RUSSIAN),
Moskovskii Inzhenerno-Stroitelnyi Institut (USSR).
For primary bibliographic entry see Field 05D.
W74-01756

THE NATIONAL WATER COMMISSION REPORT: A REVIEW,
Arizona Univ., Tuscon. Inst. of Government Research.
For primary bibliographic entry see Field 06E.
W74-01853

ECOLOGY OF SALT MARSHES AND SAND DUNES,
For primary bibliographic entry see Field 02L.
W74-01984

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
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Radioactive Waste Management, A Bibliography of Publicly Available Literature Pertaining to the USAEC'S National Reactor Testing Station, Idaho.
W74-02009 5D

Radioactive Waste Management, A Bibliography of Publicly Available Literature Pertaining to the USAEC'S Oak Ridge, Tenn. Site.
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- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

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- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

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